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ABSTRACT

To identify problems regarding economic development, the Committee for Scientific and Technical Personnel conducted an educational and occupational survey of each member country of the Organisation for Economic Cooperation and Development (OECD). The specific purpose of the surveys was to gather comparative data on the training and utilization of technicians in each member country. Major sections of each survey are: (1) The Structure of the Educational System, (2) Training of Technicians and Other Technical Manpower, and (3) Functions of Technicians. Related surveys for each of the following countries, Canada, Denmark, France, Netherlands, Switzerland, Yugoslavia, United Kingdom, Portugal, and Italy, are available in this issue as VT 015 716, VT 015 717, VT 015 719-VT 015 725 respectively. (JS)

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SCIENTIFIC AND TECHNICAL PERSONNEL

THE EDUCATION, TRAINING AND FUNCTIONS OF TECHNICIANS

SPAIN

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DIRECTORATE FOR SCIENTIFIC AFFAIRS

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

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SCIENTIFIC AND TECHNICAL PERSONNEL

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THE EDUCATION, TRAINING AND FUNCTIONS OF TECHNICIANS

SPAIN

DIRECTORATE FOR SCIENTIFIC AFFAIRS

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

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PREFACE

The O.E.C.D. Committee for Scientific and Technical Personnel has given considerable attention to the question of technician training and utilisation which is a key problem in the economic development of Member countries, and has on several occasions drawn attention to the need for an adequate supply of and proper training for skills at this level.

To clarify the situation as far as possible and to establish a solid base for discussion, the Committee has instituted a series of surveys in Member countries describing and analysing training conditions.

The material obtained is classified according to a standard pattern throughout, so that comparisons can be drawn between countries. The completed surveys were used as basic working documents for "Confrontation Meetings" between two or more countries. These meetings were held under a neutral chairman and were attended by teams of specialists from the participating countries. Delegates discussed each other's training systems and the various problems which arise and endeavoured to reach conclusions on questions of policy and to find solutions to technical difficulties.

The present publication, the fifth of a series, is a revised version of the working document used at the confrontation meeting between the Netherlands, Spain, Switzerland and Yugoslavia, held in Paris in December, 1965. The conclusions of this meeting and of the previous one between Canada and Denmark, are given in Appendix XI.

The report was prepared by the O.E.C.D. Secretariat and the responsibility for it has been with Mr. S. Syrimis, Consultant to the Directorate for Scientific Affairs. It incorporates information

already available at O.E.C.D. and in particular in the original survey carried out by a joint FEANI/EUSEC(1) Committee, supplemented by on-the-spot investigation.

The Secretariat wishes to acknowledge its indebtedness to the Spanish Educational Authorities for their help and co-operation in the preparation of this report.

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(1) FEANI: European federation of national associations of engineers.
EUSEC: Conference of engineering societies of Western Europe and the United States of America.

Part One

THE STRUCTURE OF THE EDUCATIONAL SYSTEM

I. GENERAL DATA

THE PLACE OF TECHNICAL EDUCATION IN THE EDUCATIONAL SYSTEM

1. The Spanish Educational System is at present in process of reorganisation. Its traditional structure has been reformed, particularly that of technical education, with a view to meeting modern educational and industrial requirements. Moreover, in 1949, a "Technical Baccalauréat" (Bachillerato Laboral), with marked innovating characteristics has been created within secondary education.

2. Private education plays an important part in the educational system; in fact, state education may, in many cases, especially at secondary level, be considered as complementary to private education, where the role of the Church is preponderant. Many secondary educational establishments are religious institutions and in higher education the only four private institutions "authorised" to grant degrees pertain to the Church.

3. Technical and vocational education in Spain was unified and systematised on 20th August 1955, by the Vocational Training Act providing for the education and training of skilled workers and lower-level technicians (maestros industriales) and on 20th July 1957, by the Technical Education Act providing for the education and training of upper-level technicians (Peritos). The latter's objectives were to : (a) augment the technician force in line with the needs of the country; (b) modify entry requirements to the technical schools to allow for a better and more just selection; (c) give technical education a more specific character without neglecting the basic education necessary; (d) adjust the practical aspect of the programme. This Act has been revised recently (Reform Act, 29th April, 1964) so as to : (a) shorten

the period of studies in technical colleges (perito schools) and higher technical schools (university level); (b) readjust entry requirements for technical courses, providing thus for a better integrated educational system and (c) revise the composition of the "Higher Committee for Technical Education" (para. 9 (ii)).

4. The main school courses under the present educational system are summarized below; technical and vocational courses are described in detail, under the appropriate headings. Appendix I (page 81) illustrates, in a simplified form, technical and other vocational education within the framework of the educational system as a whole.

(a) Primary level

Primary schooling (compulsory period)

Primary schooling lasts eight years (age range 6-14) and covers the compulsory school period, which has been extended recently (1964) from six to eight years. On completion of the fourth class and after passing an examination pupils may enter a secondary school for the baccalauréat course (see below), or on completion of the sixth class may enter a vocational school for pre-apprenticeship courses (see below). Primary schooling concludes with the "primary school leaving certificate".

(b) Secondary level

(i) General baccalauréat (Bachillerato general)

The General baccalauréat course constitutes the back-bone of secondary education. It comprises two levels : the lower (elemental) which lasts four years (age range 10-14) and the higher (superior) which lasts two years (age range 14-16 years) and has two streams (science and literature). Both courses are held in the secondary schools (institutos de enseñanza media). Admission requirements are four years of primary schooling plus an entrance examination. Holders of the

primary school leaving certificate may be admitted (after passing an examination) to the third year of the lower course. General baccalauréat examinations are held by a special service of the Ministry of National Education and are uniform throughout the country.

(ii) Technical baccalauréat (Bachillerato Laboral)

The technical baccalauréat course was introduced in 1949 to orientating students towards sectors essential to the economy of the country. It is also divided into two stages : the lower, which lasts five years (age range 10-15) and the higher, which lasts two years (age range 15-17) and has four different streams (para. 17). Technical baccalauréat courses are held by : (i) the technical secondary schools (Institutos laborales) and (ii) the workers' universities (Universidades laborales). Admission requirements are the same as for the general baccalauréat course.

(iii) Industrial vocational training

Industrial vocational training comprises the following stages :

Pre-apprenticeship (Pre-apprendizaje). This starts after six years of schooling and lasts two years (age range 12-14); it is given by the vocational schools.

Apprenticeship (Aprentizaje, or oficialia). Apprenticeship training consists of full-time classes in vocational schools or centres (escuelas or centros de aprendizaje); it starts at the age of 14 after full primary education or pre-apprenticeship (age range 14-17).

Craftsmanship (Maestria). Craftsmanship training is institutional and follows apprenticeship; it lasts two years (age range 17-19). "Maestria" courses are held by special vocational schools (escuelas de maestria).

(iv) Applied art and craft training

This is carried out in special centres (schools of ceramics, schools of fine arts and crafts, etc.) and lasts five years, starting after six years of schooling (age range 12-19).

(v) Lower commercial training

Commercial training starts after the lower baccalauréat (general or technical) and lasts three years (age range 14-17). Commercial courses are held by the commercial schools (esculeas de commercio). Successful students receive a certificate which qualifies them as commercial technicians (Peritos mercantiles).

(vi) Lower agricultural training

Lower agricultural training comes under the Ministry of Agriculture. Agricultural apprenticeship starts after full primary schooling, or pre-apprenticeship and lasts only one production cycle. The "capacitación agraria" courses start at the age of 16 and last one to two years.

(vii) Teacher training (primary)

Primary school teacher-training is carried out by special training colleges (state or church). Lower baccalauréat plus the passing of an entrance examination are prerequisites for admission to the courses which last three years (age range 14-17). A teacher training certificate opens the way to higher education. Holders of a private training college certificate have to pass special examinations before being allowed to teach in state schools.

(c) Post-secondary level

Courses normally demanding a higher baccalauréat certificate for entrance have been classified as post-secondary. The main courses are :

(i) Pre-university courses

These are one-year courses given by secondary schools following the higher baccalauréat. There are two streams, science and literature, leading to the "maturity" examinations, which qualify for university admission.

(ii) Upper-level technician training

Upper-level technician training is carried out in special technical colleges (escuelas de peritos). It lasts three years and follows the general or technical higher baccalauréat certificate (age range 16-19, 17-20). Admission requirements, duration and nature of studies have been revised recently.

(iii) Professional commercial training

The second stage of commercial training consists of a three-year course following the commercial technician training course (see above) and is run by the commercial schools (age range 17-20).

(d) Higher education

Technical courses at university level

Bachelor's degree (licencia) courses last five years and are run by the "higher technical schools" (escuelas tecnicas superiores). Admission requirements, duration of studies and syllabuses have been revised recently. (paragraphs 33 and 34).

II. EDUCATIONAL AND VOCATIONAL ORIENTATION AND GUIDANCE

5. Educational and vocational orientation and guidance are not organised as a regular school service. Activities in this field are initiated by the "National Institute of Applied Psychology and Psychotechnics". This institute was established in 1927, under the jurisdiction of the Ministry of Labour, specifically for the professional orientation of disabled persons. In 1931, it was transferred to the

Ministry of National Education and its scope was extended to cover : (i) clinical psychology; (ii) career information; (iii) educational and professional orientation; (iv) industrial and professional selection; (v) relevant publications, for both able and disabled persons.

6. The Institute today operates twenty-eight regional branches in several provinces of the country; it holds a considerable number of tests and examinations each year, the vast majority of which are aptitude tests requested by various firms and the Civil Service for their future employees or apprentices. Schools normally seek the advice of the Institute in difficult cases only, but there are also pupils who take aptitude tests or seek professional orientation advice on their own (or their parents') initiative.

Table 1 below gives an indication of the activities of the Institute in 1963 as regards tests and examinations.

Table 1

Number of tests held by
the Institute of Applied Psychology and Psycho-technics
(and its regional branches) in 1963

Nature of test	Number	Percentage of total tests
1. Tests for drivers	1,111,476	95%
2. Tests requested by firms	15,771	1.3%
3. Tests for Technical Colleges	3,072	0.3%
4. Tests for vocational training schools (Apprenticeship, Maestria)	17,274	1.5%
5. Professional orientation tests (general)	16,263	1.4%
6. Professional orientation tests (requested by schools)	5,671	0.5%
Total	1,169,527	100%

7. Practical subjects integrated in the curricula of certain school courses contribute positively towards educational orientation. During the last two years of primary schooling (grades 7 and 8) practical subjects constitute part of the curriculum. Practical work is also introduced as from the first grade of the technical baccalauréat courses but is completely eliminated from general baccalauréat courses.

III. AUTHORITIES IN CHARGE OF EDUCATION CO-ORDINATING AND PLANNING MECHANISMS -

(a) Ministry of Education

8. The control of education is almost entirely the responsibility of the Ministry of National Education; exceptions are the schools for agricultural overseers, and the seamen's and fishermen's schools, which come under the Ministry of Agriculture and the Ministry of Trade respectively, and some vocational training centres and the workers' universities, which are responsible to the Ministry of Labour. With a few minor exceptions, the teaching staff at state schools is also answerable to the Ministry of National Education. The role of the local authorities is confined to covering some of the expenses of the State primary and secondary schools. In view, however, of the limited resources at their disposal, this function of the local authorities has been decreasing in importance in the past few years. In Appendix II the general administrative structure of the Ministry of National Education is illustrated with special reference to Technical and Vocational Education.

(b) Advisory and co-ordinating bodies

9. The main advisory and/or co-ordinating bodies connected with technical and vocational education are as follows :

(i) The National Council of Education which is the highest advisory body in the field of Education. The Council is divided into committees with competence at each level and type of education. These committees are composed mainly of

professional people. Apart from this Council a number of other committees, institutes and commissions (see Appendix II) act in an advisory and/or administrative capacity to the Ministry. Those directly connected with Technical and Vocational Education are :

(ii) The Higher Committee for Technical Education. This Committee as specified by the recent Reform Act (1964), is "an advisory body to the Ministry of National Education on all matters on which its opinion is requested". However, for matters pertaining to syllabuses, education-co-ordination measures, subject exemption and equivalences, and the administration and organisation of technical schools, this advice is mandatory. Nevertheless, the activities of this Committee will in no way be detrimental to, or interfere with the missions specified in the terms of reference of the National Council of Education. The government intends to reorganise this Committee with the objective of ensuring preferential representation for higher and ordinary level technical schools. Representatives of the National Council of Education, the University Departments, the Research Centres engaged in training activities and the Spanish University Syndicate will also sit on the Committee".

The Reform Act provides also for the setting up in each technical school of a "Board of Trustees" with representatives of professional associations and other bodies, the trade unions, and organisations or individuals concerned with, or interested in technical education. The procedure for establishment of these boards will be regulated in each case by ordinances and by laws subject to the approval of the Ministry of National Education".

(iii) The Committee of Assessment and Supervision of Commerce is an advisory body to the Directorate of Technical Education in the field of commercial education.

(iv) The National Commission of Secondary Vocational Education and the Central Commission of Vocational and Industrial Education are advisory bodies on matters related to secondary technical schools (Bachillerato Laboral) and vocational schools (apprenticeship and maestria) respectively.

Both services have "Permanent Committees" with branches in the various provinces of the country, charged with administrative and executive responsibilities.

(c) The planning procedure

10. The work of planning is carried out by the general secretariat of the Ministry of National Education, to which the statistical research service is answerable, but education statistics are the responsibility of the National Institute of Statistics. The field of action of the other Directorates - General (Appendix II) also covers some planning functions. The absence of a Central Educational Planning Service with sufficient resources to ensure regular overall planning, and the fact that the statistical functions of the Ministry of National Education are divided among various independent offices, tends to lead to conflicting and incomplete statistics. Government is well aware of the weaknesses in this field and is now preparing a law to co-ordinate action.

Part Two

TRAINING OF TECHNICIANS AND OTHER TECHNICAL MANPOWER

IV. DEFINITION AND GRADING OF THE TECHNICIANS - STANDARDISED QUALIFICATIONS

11. In Spain, the term "maestro industrial" is used to define highly skilled workers above apprenticeship level. Certain "maestria" courses demand sufficient theoretical knowledge to justify the classification of this type of "maestro" in the lower-technician group. The higher technical baccalaureat course, now offered in twenty different disciplines, also provides for a degree of specialisation sufficient to justify classifying holders of this certificate in the lower technician category.

12. The term "perito", until recently, was used to define what actually corresponds to upper-level technicians. However, this term has now (August 1965) been replaced by the term "technical engineer" followed by the speciality, e.g. technical engineer in metallurgy. For commercial technicians the term "perito mercantil", (commercial technician) is still in use, but refers to the lower level; the upper level is specified by the term "professor mercantil".

13. Central administration and control, exercised by the Ministry of National Education concerning the standardisation of qualifications has led to uniformity in the educational structure and programmes throughout the country.

14. Syllabuses are prepared by the Ministry, in consultation with its permanent, or special "ad hoc" advisory bodies. Private schools must follow the official programmes if they wish to be recognised by the State.

15. Final examinations for technician courses are also controlled by the Ministry of National Education. For instance, when upper-level technicians, at the completion of their studies, are requested to work on a project comprising theoretical and practical work, the subject for this project is chosen by the Ministry and is the same for all students attending identical courses.

16. Certificates and Diplomas are issued by the training institutions but are endorsed by the Ministry. When private institutions are "authorised schools" their certificates are recognised as being equivalent to those of corresponding state institutions.

V. LOWER-LEVEL TECHNICIAN COURSES WITHIN THE FORMAL EDUCATIONAL SYSTEM

(a) Technical baccalauréat course

17. The technical baccalauréat course (bachillerato laboral) was introduced in 1949. It provides general education and at the same time qualifies students specifically for one of the productive branches of the economy. It is at secondary level and is divided into two parts, the lower or elementary section lasting five years, and the higher or superior, lasting two years. In the elementary section there is some specialisation in four basic areas - agriculture and animal husbandry, industry and mining, marine and fishing, and administration; further specialisation within these areas being introduced in the upper section.

18. The programme of studies, which has been revised recently for both sections, comprises approximately 33 per cent of practical work, the rest being devoted to general and special subjects as indicated in the selected examples of the time-tables given in Appendix III.

19. Requirements for admission to the lower section are four years of primary schooling plus the passing of an entrance examination. According to a recent ordinance, holders of the primary school-leaving certificate (eight years of schooling) may be accepted, after passing a test, to the third year of the lower course (technical or general).

20. Final examinations at both the elementary and higher levels are centrally controlled by the Ministry of Education. The lower technical baccalauréat certificate opens the way to higher baccalauréat courses, and through a preparatory year, to "technical colleges" for training at the upper-technician level. Holders of the higher technical baccalauréat certificate have direct access to technical colleges and may, through a preparatory year and after passing a special examination controlled by the Ministry of Education, be accepted to "institutes of technology" or universities.

21. Technical baccalauréat courses are offered by the secondary technical schools (institutos laborales) which may be State or private institutions (see Appendix VI) under the supervision of the Ministry of Education. There exist over 200 such schools holding elementary courses in the four basic areas mentioned above. As a rule, each school specialises in one basic area; about a third of them also hold higher baccalauréat courses in one or (exceptionally) two specialisations. In certain cases residential facilities are provided for the students. The number and nature of courses offered are given in Appendix III.

22. Technical baccalauréat courses at both the elementary and higher levels are also offered by the workers' Universities (universidades laborales), administered by the Ministry of Labour. These institutions follow the programme approved by the Ministry of Education and students sit for the same final examinations. There are six such institutions, all with residential facilities.

(b) "Maestria" courses

23. Although these courses are designed mainly for highly skilled workers, some of them, e.g. electronics and chemical disciplines, include sufficient elements to be considered as falling within the technician area.

24. Training is entirely institutional and lasts for two years after completed apprenticeship. After passing the final examination, controlled by the Ministry of Education, students are awarded the title of "Maestro". Curricula include such general subjects as civics, religious and physical education, as well as technology of the trade,

other related subjects and work-shop training, as shown in Appendix V together with the number and nature of courses available. Under the recent Reform Act, the "Maestro" certificate gives direct access to technical colleges.

25. "Maestria" courses are held by the vocational schools (escuelas de maestria), usually in combination with apprenticeship and/or pre-apprenticeship courses. The schools may be under State or private control (see Appendix VI) and in certain cases are equipped with residential facilities for the students. Some schools specialise in one field only, but the majority of them offer courses in two or (exceptionally) more different fields. "Maestria" courses are also held by the workers' universities in combination with technical baccalauréat, apprenticeship and pre-apprenticeship courses.

VI. UPPER-LEVEL TECHNICIAN COURSES WITHIN THE FORMAL EDUCATIONAL SYSTEM

26. Upper-level technician courses are available in ten different basic disciplines, namely: (i) industrial engineering, (ii) aeronautics, (iii) mining, (iv) naval engineering, (v) telecommunications, (vi) architecture, (vii) public works, (viii) topography, (ix) agriculture, (x) forestry, subdivided in several specialisations as shown in Appendix V. These courses are held in technical colleges which are under direct State control, and are often referred to as secondary technical schools (escuelas tecnicas de grado medio) although they are post-secondary institutions. Technical colleges offer courses in one basic field but usually specialise in several branches of this field. Entry requirements, as well as length and nature of studies, have been revised recently (Technical Education Reform Act 29th April 1964) as follows : "Holders of the Higher Baccalauréat Certificate in any of its branches - general or technical - or the Ordinary Level Commercial Studies Certificate (Peritos commerciales) as well as master craftsmen (Maestros) and primary education teachers are eligible for admission to technical colleges. Admission to these establishments is

also open to Lower Baccalauréat Certificate holders, with the exception of those graduating in secretarial studies. To qualify for entrance, however, these candidates must previously have registered for, and successfully passed through an "adaptation" course. Admission to technical colleges is also open to certified craftsmen (Apprenticeship Certificate) and agricultural and forestry foremen graduating from a government or government-approved establishment, and who have previously registered for, and successfully taken a preparatory course (see Appendix II for schematic representation). Candidates who have passed the "adaptation" or "preparatory" course examinations qualify for entrance to any technical college.

27. Technical college courses are to be limited to three years (thus abolishing the preparatory and selective courses preceding the course proper) and syllabuses are to include both basic and technological disciplines, the latter being mainly practical in character. Basic disciplines will be taught during the first year; only those students who pass in every one of the first year subjects in the same technical college may qualify for admission to the second year. The duration of studies hereby laid down is exclusive of any time devoted to the industrial training required of students before being eligible to qualify for a professional degree ..."

28. The title of "Perito" (now Technical Engineer) is awarded to students after they pass their final examinations; these examinations are centrally controlled by the Ministry of Education and qualify for direct admission to higher technical schools (university level). The same diploma may be acquired through evening courses or private tuition and training, provided the candidates have passed the final practical and theoretical examinations. A fairly high proportion (20-25 per cent) do in fact study while working in industry.

VII. VOCATIONAL COURSES AT CRAFTSMAN LEVEL WITHIN THE FORMAL EDUCATIONAL SYSTEM

29. The main form of vocational training at crafstman level in Spain is apprenticeship and "maestria"; they are both entirely institutional

and are controlled by the Ministry of National Education (Directorate of Vocational Education).

30. Apprenticeship (oficialia) lasts three years, starting at the age of 14, i.e. after the compulsory schooling period, and is usually preceded by a two-year "pre-apprenticeship" course whose main objective is to initiate the pupils into technical and other vocational training. In many cases such "initiation" courses may be found incorporated in the primary school curriculum (grades 7 and 8).

31. Training programmes comprise an average of 35 per cent practical work, 45 per cent related theory and 20 per cent general cultural disciplines. Final examinations are organised by the Ministry and are uniform throughout the country. The certificates awarded qualify their holders as semi-skilled workers (oficiales) and open the way to "maestria" courses and the technical colleges.

32. Apprenticeship courses are run by the vocational schools, which may be State or private institutions, together with pre-apprenticeship and, in certain cases, "maestria" courses as well (see Appendix VI).

VIII. TECHNICAL COURSES AT UNIVERSITY LEVEL

33. Technical courses at university level are held by the higher technical schools (Escuelas tecnicas superiores). There are twenty-two such schools under direct State control and three private, specialising in nine fields as indicated in Appendix VII. Syllabuses, length of studies, and entry requirements have been revised recently (Technical Education Reform Act, 29th April, 1964) as follows :

34. "The period for higher technical school studies will be limited to five academic years" and syllabuses will include both basic and technological disciplines, the former being taught at least during the first two years (1). To qualify for admission to the third year, the students must pass every one of the subjects taken in the first

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(1) Previously it was seven years, comprising preparatory, selective, and initiation courses, each lasting one year.

and second years of the same higher technical school. The period of higher technical education hereby laid down will be exclusive of the time taken up by the industrial training required of students before being eligible for a professional degree.

35. "Holders of a higher baccalauréat certificate in any of its branches (general or technical) qualify for admission to higher technical schools after completing the pre-university course and passing the "Maturity" examinations, or its equivalent, if students possess the technical baccalauréat certificate". Army, navy and air force officers graduating from the General Military Academy, the Special Corps Academies, the Naval Academy or the Air Force Academy, and also graduates of Technical Colleges and Higher Commercial Schools (peritos and profesores mercantiles) qualify for direct admission to higher technical schools. These students are given exemption from higher technical school subjects - or their equivalents - for which they have already qualified in their previous establishment.

36. "In addition to the Bachelor's degree in architecture or engineering, two years of post-graduate study and the presenting of a thesis will be required of candidates to the Doctor's degree..."

37. Wastage is a major problem for higher education, as less than 50 per cent of the students enrolled complete their studies. Many factors appear to influence this wastage, undoubtedly among them inadequate preparation of the students to cope with the content of the courses. At secondary and post-secondary levels, the problem of wastage is less acute.

IX. TECHNICAL TEACHING STAFF

(a) Recruitment and training

38. The selection method for teachers at both secondary and higher level is rather intricate and, in addition to a degree, a number of other qualifications, including selection in special competitive examinations, are demanded. This accounts to some extent for the

existing shortage of full-time permanent teaching staff, which is close to 30 per cent; vacancies are filled by inadequately trained part-time teachers. A new system of recruitment is now being tried in technical secondary schools, technical colleges and vocational schools; staff appointments are by competitive examination and applicants must hold a degree or "perito diploma" in engineering, architecture, or other subjects appropriate to the post offered. Examinations for appointment in technical colleges and commercial schools are called "oposicion" and entitle successful candidates to direct appointment, while those for posts at vocational or secondary technical schools open the way to a special one year course, run by the "Institute for the Training of Vocational Teachers", which should precede appointment. In both cases, first employment is on a temporary basis for a period of five years, which may in certain cases be extended for a further five years, at the end of which teachers are expected to sit for a second examination for confirmation of their appointment to a permanent post.

39. As regards pupil/teacher ratios, data available are on the basis of the number of teachers taking classes in each school, but, as many teachers work in several schools, there is a high proportion of double counting. In secondary technical education, the number of teachers practically doubled during the 1951/60 period. However, owing to the large increase in pupils over the same period, the pupil/teacher ratio continued to deteriorate, as may be gathered from Table 2 below.

Table 2

Number of teachers, and pupil/teacher ratios in secondary technical education (1951-1960)

Year	Number of teachers		Pupil/teacher ratio	
	Total teachers	Senior and assistant teachers and lecturers	All teachers	Senior and assistant teachers
1951	1066	547	15.1	27.8
1956	1323	546	13.1	33.7
1960	1861	613	18.1	58.7

Source : National Institute of Statistics.

40. Training of technical teachers is entrusted to the "Institute for the Training of Vocational Teachers" (Institución de Formación del Profesorado de Enseñanza Laboral) established in 1952. This Institute is controlled by the Ministry of National Education (Directorate of Vocational Education) and its main functions are : (i) to prepare and hold courses for teachers in secondary-technical and vocational schools; (ii) to organise final examinations for technical baccalauréat apprenticeship and maestria courses; (iii) to prepare, in consultation with the appropriate bodies, the syllabuses for secondary-technical and vocational courses.

41. Courses for employed technical teachers are normally short courses (1 to 2 weeks) and cover basis pedagogical subjects as well as special industrial techniques. Permanent teachers are expected to attend such courses every 4 or 5 years. Participants receive a subsistence allowance from the government to cover their travelling and residence expenses during the courses.

(b) Status and salaries

42. Information available concerning teachers' salaries is inadequate and refers to public education only. The present salary system does not follow any general plan but is the result of a series of corrective measures which are being taken to make up for the inadequacy of budget allocation. Salaries depend to a large extent on the school-fees received and on the level and type of institution as shown in Table 3.

43. Although the figures given in this table are only approximate and some may be too low, as they do not include all the income received under several headings, it may be stated that (1) :

(i) All salaries are too low (2), as borne out by the fact that a senior skilled worker in industry earns about P. 84.000 a year, i.e. almost 64 per cent of the salary of a senior

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(1) Taken from the MRP (Mediterranean Regional Project) Report, (OECD 1965)

(2) Government is well aware of this inadequacy and plans to introduce shortly a revised integrated salary system for the whole Civil Service as a consequence of which there will be considerable increase in teachers' salaries.

teacher at a technical college. This makes the teaching profession unattractive for university graduates, as shown by the great number of vacancies for teachers in secondary education.

(ii) In many cases there exist differences in salary levels not justified by differences in function. Particularly noticeable are the enormous differences which exist between the salaries of senior teachers at secondary-general schools and those of the same category in other secondary-level institutions.

Table 3

Teacher salaries by type of teacher and level of education - 1965

(Thousand pesetas per year)

Level and type of education	Senior teachers (1)	Lecturers & assistant teachers	Auxiliary teachers	Laboratory teachers
1. Primary education	56.4	-	-	-
2. Secondary education				
(i) General	145.0	85.0(2)	-	-
(ii) Primary teacher training	60.0(3)	-	-	-
(iii) Technical (Baccalauréat)..	60.0	24.0	21.5	-
(iv) Commercial	63.5	21.4	16.8	-
3. Post secondary				
Technical colleges (Peritos)	131.8	22.7	22.7	-
4. Higher education				
(i) Higher Technical Schools	194.5	30.0	30.0	132.0(4)
(ii) Universities ...	235.0	18.0	6.0	72.0(4)

(1) Including, according to branch, "maestros, and other specialist teachers".

(2) Some teachers collect two salaries by teaching in both the male and female Teacher Training Colleges.

(3) Temporary assistant teachers receive 55,000 pesetas per annum.

(4) Highly variable according to faculty; in some cases attaining 12,000 but generally much less.

X. TRAINING OUTSIDE THE FORMAL SYSTEM

(a) Courses held by the Ministry of Labour

44. The main activities of the Ministry of Labour in the field of technical and vocational education may be summarised as follows :

(i) Regular courses at craftsman and lower technician levels. These cover pre-apprenticeship, apprenticeship, maestria and technical baccalauréat and are run by the "workers universities" (universidades laborales) which are residential institutions combining all or some of the above mentioned courses. The programmes of study comply with the official programmes approved by the Ministry of Education for the corresponding courses under its own control and lead to the same final examinations.

(ii) Accelerated training. This covers the lower craftsman level and comprises short courses, lasting from two to six months, in several trades considered vital to the economy of the country. Under this scheme 2,358 persons were trained in 1964 in the 84 training centres then in function.

(iii) Intensive vocational training. This project started in 1964 with the main objective of training or retraining the unemployed through short intensive courses in productive fields. Similar courses are held by the Church authorities, the "Movimiento" (national movement) and the trade unions, as shown in Table 4 below.

(b) Activities of the Ministry of Industry

45. Activities of the Ministry of Industry in technical and vocational education are concentrated in the "National Commission of Industrial Productivity". This Commission was established in 1955 with the objective of training technical personnel for middle-management and foremanship in industry. The main courses last two weeks and cover management, human relations, productivity, and special industrial techniques.

Candidates are selected by the firms and normally belong to the technician category. Instructors are mainly part-time, experienced technicians or university graduates who have attended special training courses.

(c) Activities of the Ministry of Information and Tourism

46. The Ministry of Information and Tourism contributes to Hotel and Catering training by means of the "Official School of Tourism", established in 1963. The school is administered by the "Institute of Touristic Studies", a semi-governmental institution created in 1962.

(d) Courses held by non-governmental organisations

47. The Church plays a predominent role in technical and vocational education; it has direct control over many secondary technical schools and vocational training centres (Appendix VI), and participates actively in special training projects (Table 4). At the higher level, Church operates the ICAI (Instituto Catolico de Artes y Industria), an institution recognised by the State as equivalent to Higher Technical Schools.

48. The Delegacion Nacional de Sindicatos (Association of Trade Unions) contributes largely to the vocational training programme. A number of training centres and institutions are under direct trade union control, while participation in special training projects is both active and extensive, as may be gathered from Tables 5 and 6 below.

49. Several Employers' Associations participate actively in vocational training programmes. The Madrid Chamber of Commerce (Camara de la Industria de Madrid) for instance, holds several schools and special courses in economics, commercial and industrial subjects and awards special prizes to graduates of higher technical schools and successful employees of member firms.

Table 4

Intensive vocational training courses, 1964

Authorities holding the courses	Number of courses	Number of trainees
1. Ministry of Labour		
(a) Universidades Laborales	59	2,259
(b) Other centres	261	7,592
2. Church	390	13,290
3. Movimiento	54	4,402
4. Trade Unions	140	10,010
Total	904	37,553

Table 5

Total number of pupils who attended courses in centres and institutions under Trade Union control (1942-1964)

	Field	Total number of pupils
1.	Pre-apprenticeship	142,011
2.	Apprenticeship	212,505
3.	"Maestria"	3,067
4.	Accelerated and intensive training	7,678
5.	"Profesorado"(1)	2,337
6.	Technical Baccalauréat	2,964

(1) "Profesorado" : Training of instructors for accelerated and intensive training courses.
Source : Delegacion Nacional de Sindicatos.

Table 6

Number of vocational training centres under Trade Union control, total enrolment, number of graduates (1940-1964)

School year	No. of centres	Enrolment	No. of graduates
1940-41 ...	6	1,291	-
1944-45 ...	37	7,584	258
1948-49 ...	51	12,800	1,799
1952-53 ...	78	14,667	2,400
1956-57 ...	94	19,985	3,403
1960-61 ...	112	26,229	3,982
1963-64 ...	115	30,892	6,324

Source : Delegacion Nacional de Sindicatos.

XI. COMMERCIAL EDUCATION

50. Commercial education is under the juridiction of the Ministry of Education. Courses at both secondary and post-secondary level are held by the commercial schools (escuelas de commercio) and are divided into two parts, each lasting three years. The first starts after the general baccalauréat course and leads to the certificate of "commercial technician" (perito mercantil); the second leads to a certificate corresponding to upper technician level (profesorado mercantil).

51. Courses with a commercial bias at secondary level are also given by the secondary technical schools (technical baccalauréat commercial branch, administration). Over 50 per cent of the secondary technical institutions specialise in this field. (Appendix III). Data concerning the number of commercial schools and enrolments are given in tables 17 and 18) under educational statistics.

52. At the higher level commercial education is now available in the University as a result of recent legislation providing for the creation of Political, Economic and Commercial Science Faculties. Special arrangements allow graduates of the second part of the commercial course (profesorado) direct access to these faculties.

XII. AGRICULTURAL EDUCATION

53. Responsibility for agricultural education is divided between the Ministry of Agriculture and the Ministry of Education as follows :

(a) The Ministry of Agriculture controls :

(i) Agricultural apprenticeship

This starts at the age of 14, after compulsory schooling, and lasts for at least one production cycle. Trainees receive practical and theoretical training adapted to regional

conditions. On successfully completing the course students receive a "certificate of aptitude".

(ii) "Capacitación agraria" courses

These are special courses of one to two years' duration, having as their main objective the training of farm foremen and special agricultural technical experts. Students start the courses, which are held in special residential schools, at the age of 16. There are now 28 such schools with a total enrolment of over 2,000 trainees covering eight special sections including farm management. The training programme comprises practical work (over 50 per cent),related theory and general cultural disciplines, such as language and civics. Practical experience in agriculture is a pre-requisite for admission to these courses. Holders of the Capacitación Agraria certificate are classified as foremen and are eligible for admission to the technical colleges provided they had previously been registered in, and taken, a preparatory course.

(iii) Agricultural extension service

Trainees for the extension service are carefully selected through special examinations among candidates with varying technical background (University graduates, technicians, foremen). Training consists of a six-month basic course, supplemented by field work for several years, depending on the individual's personal abilities in the capacity of an assistant officer.

(b) Ministry of Education

54. Responsibility of the Ministry of Education in the field of agricultural education is limited to formal training which comprises :

(i) Technical baccalauréat courses in agricultural and animal husbandry (Appendix III), (ii) post-secondary courses in several fields (Appendix V), and (iii) university courses in agronomy and forestry.

55. All the above courses comply with the general rules for secondary, post-secondary and higher education described under the appropriate headings in the text.

XIII. HOTEL, CATERING AND TOURISM COURSES

56. Tourism courses at secondary level are included in the higher technical baccalauréat certificate and are offered by several secondary technical schools.

57. The Ministry of Information and Tourism operates a special school (Official School of Tourism) through a semi-governmental organisation called the "Institute for Tourism Studies". This school, which started in 1963, has as a main objective the training of middle-management personnel for hotels and tourism offices. Courses last three years and they may be considered as post-secondary since a higher baccalauréat certificate (branch administration) is required for admission.

58. Trade Unions operate ten schools with hotel and catering courses at apprenticeship level (duration one year), one school for tourism training, and one post-secondary institution for hotel management and tourism trades. All schools are recognised by the State and are supervised by the "Institute for Tourism Studies".

59. Several private organisations operate a total of seventeen schools running tourism courses at secondary and/or post-secondary level, some of which are recognised by the State.

Part Three

F U N C T I O N S O F T E C H N I C I A N S

XIV. TECHNICIANS AND THEIR OCCUPATIONS

(a) General Remarks

60. Upper-level technicians are found not only in special jobs in industry or the Civil Service but often in administrative posts, in charge of several departments, or in education as well. Many have set up as independent consultants, or run their own businesses. Table 7 below gives an indication of the types of occupation filled by "industrial technicians".

Table 7

Occupations of industrial technicians

Nature of occupation	Percentage of total
1. Private business	11
2. Freelance (consultants, etc.)	4
3. Managerial jobs or technical jobs normally demanding a university degree	35
4. Higher technician jobs proper (in technical fields)	45
5. Education and Civil Service	5
Total	100

Source : Asociación Nacional de Peritos Industriales.

Upper-level technicians are organised in several professional associations according to their speciality. Industrial technicians have fourteen regional associations under a central organisation, the "Associación Nacional de Peritos Industriales". This association is mainly concerned with professional matters, its educational activities being very limited. A monthly bulletin (Tecnica Industrial) issued by the Association keeps members informed on new developments in industry. University engineers are also organised in several associations according to speciality, but have a central co-ordinating body, the "Institute of Civil Engineers" (Instituto de Ingenieros Civiles) (1).

61. The title "Perito" is considered by the Associations of Technicians as inappropriate and misleading and they have requested that it should be replaced by that of "specialist engineer" or something similar. It is for this reason that the Government has recently adopted the title "technical engineer" (paragraph 12). Furthermore,the Association of Industrial Technicians claims that the responsibilities allocated by the present law to industrial technicians, especially in the field of electricity are very limited. Steps have been taken and firm proposals have been submitted to the government for the revision of this law.

62. Lower-level technicians do not appear as a separate group in the technical labour force of the country. Holders of technical baccalauréat certificates are found in all sorts of jobs, and have a great variety of responsibilities, while "maestros-industriales" are normally occupied in production and maintenance jobs, the most efficient being promoted to foremen.

(b) Summary of a Survey on the Functions of Technicians in Industry

63. A special survey on the functions of technicians in industry was carried out by OECD in 1963, and covered : (i) manufacture of electronic measuring instruments (3 firms); (ii) manufacture of machine-tools (3 firms); (iii) supply and distribution of electricity (3 firms). A total of 32 "formal" interviews were held with technicians in several

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(1) The term "civil engineer" is used here as opposed to "military engineer" and not in its usual sense.

different fields as indicated in Appendix VIII. The results of the above survey may be summarized as follows :

(i) Function and position of technicians in the firms : the different posts held by technicians in the industries examined may be grouped as follows :

Managerial : in general, management feels that this post should be filled by graduate engineers. However, it was found that some technicians had been assigned this type of duty.

Production : most firms appoint industrial technicians (upper-level).

Ancillary : in this post were found holders of various titles and diplomas such as industrial technicians (upper-level) who may have studied at private schools, holders of non-recognised diplomas, people who have had a mixed education, promoted "maestros" etc.

Supervisory : in general this type of post is occupied by "maestros industriales" with or without recognised qualifications.

64. In Appendix VIII, the actual qualifications of the technicians interviewed are indicated together with those desired by the firm for their posts.

(ii) General observations

(1) Nowhere was a professional engineer found to be working as a technician; (2) firms, with two exceptions showed no desire to increase their technician force, at least in the near future; (3) management claimed that, in general, technicians need to have more extensive training with greater emphasis on practical work; (4) firms prefer to recruit technicians who have been through a recognised school, the majority giving preference to those who have just left, since further training can then be easily given in the firm; (5) the factors attracting technicians to their jobs appear to be : security of employment, occupational and social stability;

the desire to follow the occupation they have chosen; geographical factors, and promotion prospects; (6) most technicians expressed a desire to raise their standard of general education

XV. CAREERS AND STATUS OF TECHNICIANS

(a) Prospects for promotion

65. The fact that 35 per cent of the total industrial technician force is occupied in managerial posts or technical jobs normally requiring a university degree (Table 7), makes it evident that social promotion prospects, at least for this field of specialisation, are not limited. Furthermore, the recent Reform Act on Technical Education facilitates the upgrading of technicians through further studies by granting them direct access to Higher Technical Schools.

(b) Earnings

66. Earnings of technicians vary considerably depending on the field of activity and the nature of the duties they are assigned. The average income of upper-level technicians which amounts to about 67 per cent of that of University engineers, is positively higher than that of other technicians, and slightly higher than that of first grade administration officers, as shown in table 8 below. Civil service salaries are generally lower than those in private industry; the basic starting salary is fixed, and increments amounting to about 5 per cent of the basic salary are granted every two years.

Table 8

Average income of skilled personnel by industrial or commercial field - End of 1964

Field of activity	Average income per hour of work (in pesetas)				
	University Engineers	Upper-level Technicians	Other (1) Technicians	Semi-skilled workers male (2)	Administrative officers (3)
1. Extraction of carbon	60.5	50.9	36.6	35.0	35.7
2. Mining - metallic minerals	59.7	38.7	26.9	24.2	33.5
3. Mining - non metallic minerals	86.4	57.8	34.6	23.7	49.9
4. Food, beverage, tobacco industry	51.5	41.9	31.9	24.4	38.0
5. Textile industry	50.4	41.1	34.7	27.7	48.0
6. Shoe & Clothing industry	57.1	29.1	26.9	20.0	29.8
7. Wood & cork industry	76.8	44.8	51.0	22.4	46.2
8. Paper industry	82.9	47.5	29.9	25.5	55.0
9. Press, publications	67.1	47.5	46.0	29.2	45.5
10. Rubber industry	141.9	90.3	49.8	30.4	84.0
11. Chemical products	69.4	49.4	32.6	25.3	47.6
12. Carbon and other mineral products	68.2	52.9	38.2	24.1	42.4
13. Metal industries, machine construction.	92.6	60.0	37.5	26.0	53.3
14. Building construction	69.9	35.1	27.3	17.7	32.3
15. Electricity, gas	96.2	56.4	36.7	23.6	52.4
16. Commerce	78.3	62.3	34.0	19.0	38.6
17. Banks and other financial organisations	135.0	96.6	50.0	42.9	76.4
18. Insurance	63.8	28.3	45.1	31.9	57.0
Average income	78.2	51.7	37.2	26.3	48.1
Average as a percentage of the average of the first column	100%	67.5%	47.5%	33.5%	61.5%

(1) Laboratory and workshop technicians (Maestria level

(2) Grade : "Official 1st" (Apprenticeship)

(3) Grade : "Jefes" (Chiefs)

Source : Instituto Nacional de Estadisticas, Salarios, tercer trimestro, ano 1964.

Part Four

G E N E R A L I N F O R M A T I O N

S T A T I S T I C A L D A T A

67. One of the main obstacles to the judicious planning of education is the lack of information and statistical data. The estimates, remarks and recommendations included in this section have been mainly based on the MRP (Mediterranean Regional Project) study : "Education for Economic and Social Development, Spain". It should be noted, however, that some of the figures are no longer valid, mainly as a consequence of the implementation of the Economic Development Plan (1964).

XVI. THE FINANCIAL SITUATION

(a) National income, industry and trade

68. The expansion and growth of the Spanish economy is borne out by the increase in both the Gross National Product and the National Income over the past few years (Tables 9 and 10). Reckoned in standard pesetas (1) national income increased by approximately 160 per cent during the 1940-64 period, while per capita income rose by 115 per cent over the same period. Both production and demand continued to rise substantially in 1965.

69. Despite the industrial expansion of the past few years (which may be verified by the indices of production given) for the period 1954-63 in Table 11, there were no substantial changes in the contribution

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(1) 60 pesetas = 1 U.S.A. dollar.

made by three economic sectors to the Gross Domestic Product of the country, at least for the period 1957-63 (Table 12).

70. A breakdown of industrial revenue by field of industry for the period 1954-58 is given in Table 13. Foremost in growth for the above period was the electric power and gas utilities industry, with the metal industries and construction coming second and third respectively.

71. The structure of foreign trade is typical of an agricultural country which is also rich in minerals and is in the process of industrialisation. Exports consist roughly of 55 per cent food products, 20 per cent raw materials, and 25 per cent manufactured goods. Imports include food to supplement home production, raw materials, and a variety of manufactured products now in increasing demand as a result of the industrialization process and the rise in the standard of living. A large part of the imports are indispensable and the demand for them is increasing considerably (Table 14).

(b) Expenditure on education

72. Public expenditure on education has grown more rapidly than GNP during the past few years, as may be seen from the per cent increase in the education budget. The credits budgeted for the Ministry of National Education more than tripled at constant prices between 1952 and 1962, reaching in this latter year 9.3 per cent of the State budget, against 7.8 per cent in 1951 (Table 15). As a percentage of GNP these credits rose from 0.6 per cent in 1951 to 1.1 per cent in 1962.

73. In 1951, total expenditure on education was pesetas 10,520 million or 1.8 per cent of GNP (2.1 per cent of National Income) distributed by level and type of education as shown in Table 16. About 71 per cent of this was budgeted by the State, 9.7 per cent only being derived from fees charged in institutions coming under the Ministry of National Education. The balance was derived from : (i) the PIO; (ii) other ministries; (iii) independent institutions; (iv) the "vocational training quota" paid by enterprises; (v) the "workers' universities" funds, financed through the social pension funds; (vi) the Trade Unions; (vii) the local authorities.

74. Before 1961, practically all budget credits for education were included in the budget of the Ministry of National Education, but the situation changed with the establishment of "Patronato de Igualidad de Oportunidades" (PIO = Council of Equal Opportunities) which is financed entirely by proceeds from income tax. The revenue of this Institution rose from Pesetas 600 million in 1961 to 1,200 million in 1962 and 2,000 million in 1963. It is used to assist pupils, to provide scholarships for the purchase of school equipment, etc. and is administered by the Ministry of National Education.

Table 9

Gross National Product 1957-1963

Year	Millions of current Pesetas	Year	Millions of current Pesetas
1957	435,011	1961	580,998
1958	496,630	1962	652,395
1959	521,446	1963	769,250
1960	527,668		

Source : Espana, Annuario Estadistico, 1965 (Instituto Nacional de Estadistica)

Table 10

National income 1940-1964

Year	National income		Per capita income	
	In millions of current pesetas	In millions of 1953 pesetas	In current pesetas	In 1953 pesetas
1940	36,458	166,795	1,409	6,445
1946	90,522	199,328	3,351	7,379
1950	138,446	192,287	4,968	6,900
1954	258,397	257,112	8,987	8,943
1958	440,210	301,514	14,842	10,166
1960	489,940	321,905	16,168	10,623
1962	605,096	368,063	19,635	11,943
1963	713,095	407,018	22,946	13,097
1964	798,142	434,009	25,469	13,849

Source : (a) National Economic Council (1940-1958)
(b) Instituto Nacional de Estadistica (1960-1964)

Table 11

Indices of production - 1954-1963 (Average 1953/54=100)

Year	Sector				
	Agriculture	Fishing	Mining	Industry	Total
1954	107.1	100.9	100.8	105.1	105.8
1956	103.7	116.6	117.2	123.2	114.3
1958	112.3	121.6	128.9	148.4	131.5
1960	115.6	137.6	131.8	169.4	144.0
1962	127.4	158.3	129.1	203.3	166.8
1963	139.4	172.3	126.3	215.6	181.8

Source : Annuario Estadistico, Espana, 1965.

Table 12

Percentage contribution of the productive sector to the Gross Domestic Product (1957-1963)

Sector	Years				
	1957	1958	1960	1962	1963
1. Primary sector	24.6	25.6	25.7	26.8	26.4
(i) Agriculture	23.9	24.9	24.8	25.8	25.4
(ii) Fishing	0.7	0.7	0.9	1.0	1.0
2. Secondary sector	36.1	35.2	34.6	32.9	34.0
(i) Mining	2.2	1.9	1.9	1.4	1.3
(ii) Manufacturing	26.9	26.4	26.1	24.9	25.6
(iii) Construction & Public works	5.3	5.0	4.1	4.3	4.8
(iv) Gas, electricity, water ...	1.7	1.9	2.5	2.3	2.3
3. Services	39.3	39.2	39.7	40.3	39.6
(i) Transport & communications.	5.6	5.7	6.4	6.4	6.2
(ii) Trade	14.5	14.5	13.1	12.1	11.6
(iii) Finance, insurance, real estates	6.1	6.1	6.4	6.9	6.8
(iv) Public administration & defence	5.7	5.9	6.3	6.9	7.0
(v) Other services	7.4	7.0	7.5	8.0	8.0
Total	100.0	100.0	100.0	100.0	100.0

Source : Annuario Estadistico, Espana, 1965.

Table 13

Industrial revenue 1954-1958

(in million pesetas of each year)

Industrial field	1954	1955	1956	1957	1958	% Change 1954-1958
1. Metal industry	15,312	18,175	20,652	27,509	31,967	109
2. Construction & construction materials	14,538	16,587	18,521	26,802	28,642	98
3. Textiles	10,980	11,788	12,999	14,924	15,740	44
4. Food & beverage industry, tabac	9,909	10,380	11,350	12,905	15,142	53
5. Chemical industry, rubber	7,990	9,174	10,604	12,924	15,116	90
6. Wood & cork industry	5,050	5,826	6,675	8,038	9,177	82
7. Electricity & gas	3,382	4,369	5,832	6,719	8,572	154
8. Footwear, leather industry	2,714	3,042	3,831	4,908	4,959	83
9. Paper industry	2,708	2,914	3,349	4,151	4,452	65
10. Coal mining.....	2,971	3,175	3,486	5,443	5,637	90
11. Other industry	2,382	2,609	2,942	3,456	3,514	47
Total	77,936	88,039	100,241	127,779	142,918	83

Source : The Madrid Chamber of Industry - Background informationson Spanish Economy, 1960.

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Table 14

The trade balance 1960 - 1963

(in million pesetas)

Years	a. Imports	b. Exports	c. Difference (b - a)	d. Index (a:b = 100)
1960	43,286	43,564	+ 278	99.4
1961	65,537	42,575	- 22,962	153,9
1962	94,170	44,162	- 50,008	213.2
1963	117,272	44,116	- 73,156	265.8

Source : Instituto Nacional de Estadistica, Espana, 1965.

Table 15

Budgeted public expenditure on education 1951-1962

(Ministry of National Education and PIO)

Year	Million pesetas x 1000	% of budget	% of GNP	Index per capita at constant prices
1951	1.5	7.8	0.6	100
1956	2.9	7.9	0.7	164
1959	4.3	7.2	0.7	190
1960	5.6	9.0	1.0	228
1961	6.7	-	1.1	-
1962	8.3	9.3	1.1	307

Source : MRP Report.

Table 16

Total expenditure on education. Source of finance and break-down by level and type of education - 1961

(in million pesetas)

Level and type of education	Ministry of Education	Other sources (1)	Total
1. General expenditure	206.2	30.0	236.2
2. Primary education	3,856.9	690.7	4,547.6
3. General secondary and similar (2)	387.9	506.0	893.9
4. Technical, secondary (3)	112.7	1,500.5	1,613.2
5. Technical, post-secondary (4) ...	200.0	70.1	270.1
6. Technical higher	189.3	69.2	258.5
7. Universities	380.9	214.2	595.1
8. Other	269.6	294.9	564.5
9. Unclassified	501.4	1,039.6	1,541.0
Total	6,104.9	4,415.2	10,520.1
Technical (4, 5 and 6) as a percentage of total : 20%			

(1) As quoted in paragraph 72.

(2) General baccalauréat, Commercial schools and primary teacher-training.

(3) Vocational training schools and technical baccalauréat.

(4) Technical colleges.

Source : MRP Report.

XVII. EDUCATIONAL STATISTICS

(a) Courses : enrolments and output (Tables 16-26)

75. Tables 17, 18 and 19 show enrolments for each level of education for the period 1950-1962, together with the percentage change. According to this data emphasis on technical and vocational education is constantly increasing. However, middle-level technical personnel is still scarce in Spain, and a further increase in the number of graduates from secondary technical schools and technical colleges is urgently needed.

76. According to the MRP findings, summarised in Tables 20 and 21, it is expected that by 1975 the 6-13 age group will be completely enrolled, the enrolment ratio will treble for the 14-17 age group and will rise by well over 150 per cent in higher education. The imbalance of the present system, where 82 per cent of the school population are enrolled at primary level, will thus be corrected; the secondary and higher levels should account for about two-fifths of the school population, as against less than one-fifth in 1960.

77. Further analysis of enrolments in technical and vocational courses, as well as the output of these courses, is given in Tables 22 to 27. According to Table 24, the ratio of output of university level technical courses to upper-level technician courses has only slightly changed during the period 1957-1962.

(b) Teacher requirements

78. Table 28 indicates the number of teachers in each level of education in 1960, and forecasts requirements for 1975. According to the MRP study, at secondary level there is likely to be a shortage of some 14,000 teachers between 1960/61 and 1966/67 and emergency measures may have to be taken, particularly as far as science teachers are concerned, to meet this situation. However, the greatest difficulties with respect to teacher supply are likely to arise in higher education where, in some faculties, a full-time teaching staff four times larger than that of 1960 will be required by 1975.

(c) Building requirements

79. The situation at primary level may be considered tolerable owing to the School Building Plan which has provided space for a rapidly growing number of pupils. At secondary level, there is a general shortage, although in certain types of technical education, buildings are obviously under-utilised. Existing State secondary schools are clearly insufficient to satisfy demand. This lack largely explains the growing of both so-called "free" pupils and those who attend recognised private schools (see (d) below). A systematic school-building plan, similar to that initiated in 1957 for primary education, is required if the targets for 1975 are to be reached (Table 29).

(d) Public and private schools

80. Traditionally, private schools have played an important part in education in Spain. At present, about three-quarters of the pupils at primary level attend State schools, most of the remainder going to Catholic schools. In secondary general education the situation is reversed. Only 17 per cent of the pupils attend State schools, the remainder being divided into two distinct categories, those in legally recognised schools, and the so-called "free" pupils. Recognised private schools must meet a series of requirements stipulated by the State, concerning staff, facilities, etc. The "free" pupils are those who are either attending unlicensed schools, studying by themselves, or attending private classes. In all cases, they are required to pass annual examinations in State schools.

81. More than 60 per cent of pupils in vocational training schools are in establishments not under the Ministry of National Education. Of these, 65 per cent are in non-religious private and trade-union managed schools (about equally divided between the two categories), a further 24 per cent in Church establishments, and about 11 per cent in the Workers' universities (Universidades laborales, see Appendix VI for number of establishments). These latter establishments are financed by labour associations under the Ministry of Labour. The State schools take most of the pupils enrolled for the technical baccalauréat course, the Church schools coming second. Table 30 shows a comparison between 1951 and 1960 as regards the distribution of pupils between State, private recognised and not recognised education (MRP report).

Table 17

Enrolments in each level of education and percentage change

(School years 1950/51 - 1961/62) (1)

Level and type	1950/51	1954/55	1958/59	1961/62	% Change 1950-1962
1. Primary	2,780,145	3,278,352	3,467,795	3,633,464	31
2. Secondary & Post-secondary (total)	372,602	458,932	646,820	761,594	105
(i) General baccalauréat	221,809	292,503	420,852	506,625	129
(ii) Technical baccalauréat	720	7,008	15,536	27,469	3,700(2)
(iii) Vocational training (pre-apprenticeship, apprenticeship, maestria.)	19,308	20,917	61,294	74,091	284
(iv) Technical post-secondary	11,291	14,391	24,222	44,526	284
(v) Commercial schools	51,674	50,593	31,469	18,370	-30(3)
(vi) Artistic (Fine arts, music, applied arts)	46,714	48,307	56,866	47,340	1
(vii) Primary teacher-training	21,086	25,213	36,581	43,173	105
3. Higher (total)	54,605	62,239	71,372	81,161	485
(i) Universities	51,633	58,666	65,463	63,557	23
(ii) Higher technical schools	2,972	3,573	5,909	17,604	490
Total	3,207,352	3,799,523	4,185,987	4,476,219	40

Source : Ministry of Education, Datos y cifras de la ensenanza en Espana, 1964.

(1) in round figures
(2) Introduced in 1949
(3) Decrease is mainly due to the creation of the "Administration" branch of the Technical baccalauréat, and the faculty of political and commercial sciences.

Table 18

Enrolments in each type of secondary and post-secondary education as a percentage of total

(School years 1950/51 - 1961/62

Type of Education	Enrolments as a percentage of total				% Change 1950-62
	1950/51	1954/55	1958/59	1961/62	
1. General	59.5	64.0	65.0	66.5	7.0
2. Technical and vocational	8.5	9.0	15.5	19.5	11.0
3. Commercial	14.0	11.0	5.0	2.5	-11.5
4. Artistic	12.5	10.5	9.0	6.0	- 6.0
5. Primary teacher-training	5.5	5.5	5.5	5.5	-
Total	100.0	100.0	100.0	100.0	-

Table 19

Enrolment in each type of Higher Education as a percentage of total

(School years 1950/51 - 1961/62)

Type of Education	Enrolments as a percentage of total				% Change 1950-62
	1950/51	1954/55	1958/59	1961/62	
1. Universities	94.5	94.5	91.5	78.5	-16.0
2. Higher Technical schools	5.5	5.5	8.5	21.5	16.0
Total	100.0	100.0	100.0	100.0	-

Table 20

Enrolments in each level of education 1961
1975 and percentage change expected

Level	1960	1975	% Change
1. Primary	3,224.5	3,806.4	18
2. Secondary (total)	633.2	2,081.6	223
(i) General (including commercial schools)	515.6	1,571.5	205
(ii) Technical (including technical colleges)	56.7	245.3	330
(iii) Vocational	60.9	264.8	335
3. Higher (total)	75.6	199.3	162
(i) Scientific and technical	31.7	80.6	157
(ii) Other	43.9	118.7	171
Total (1, 2 and 3)	3,933.3	6,087.3	55

Source : MRP Report.

Table 21

Number of graduates from secondary and higher education 1961, 1975

Type	1961		1975	
	No. of graduates	% of total	No. of graduates	% of total
1. Secondary (total)	34,600	100	307,000	100
(i) General (including commercial schools)	24,400	70	145,000	47
(ii) Technical (including technical colleges)	4,400	13	54,000	18
(iii) Vocational	5,800	17	108,000	35
2. Higher (total)	5,700	100	27,900	100
(i) Scientific and Technical .	2,000	35	11,300	41
(ii) Other (including medicine)	3,700	65	16,600	59

Source : MRP Report.

Table 22

Upper-level technician courses - Enrolments and output

(School years 1957/58 - 1961/62)

Field	Enrolments					Output				
	1957/58	1958/59	1959/60	1960/61	1961/62	1957/58	1958/59	1959/60	1960/61	1961/62
1. Industrial engineering, (mechanical, electrical, chemical textile)	15,053	17,117	25,070	27,370	30,233	1,094	1,156	1,358	1,530	1,769
2. Aeronautics (1)	-	-	-	-	-	-	-	-	-	-
3. Mining	1,559	1,784	2,686	3,396	2,431	211	302	351	343	215
4. Naval (1)	-	-	-	-	-	-	-	-	-	-
5. Telecommunications .	134	190	234	1,163	932	55	91	84	298	153
6. Architecture	1,391	2,610	2,819	3,321	5,240	220	236	291	290	363
7. Public works	201	224	236	893	1,302	104	117	118	104	69
8. Topography	162	164	197	264	299	27	20	30	54	34
9. Agriculture	1,214	2,046	2,122	2,831	3,425	240	285	388	289	265
10. Forestry	-	87	370	672	664	-	-	-	49	54
Total	19,714	24,222	33,734	39,910	44,526	1,951	2,207	2,620	2,957	2,922

(1) Started in 1962/63

Source : Ministry of Education. Datos y cifras de la ensenanza en Espana, 1964.

Table 23

Higher Technical Schools: Enrolments and Output
(School years 1957/58 - 1961/62

Field	Enrolments					Output				
	1957/58	1958/59	1959/60	1960/61	1961/62	1957/58	1958/59	1959/60	1960/61	1961/62
1. Industrial engineering	2,012	3,507	5,866	7,671	8,402	203	262	280	268	335
2. Aeronautics	188	392	447	687	731	29	31	32	32	38
3. Mining	385	495	652	876	1,027	58	56	62	67	69
4. Naval engineering	126	328	424	469	536	31	22	22	19	31
5. Telecommunications ...	218	431	610	838	872	29	27	30	39	8
6. Architecture	519	747	959	1,516	1,668	84	98	84	93	84
7. Civil engineering	421	828	984	1,449	1,874	87	80	68	79	85
8. Agronomy	371	604	871	1,379	1,549	45	56	64	63	76
9. Forestry	252	301	301	428	471	48	43	46	47	38
10. Textiles	307	275	359	392	474	24	19	34	28	26
Total	4,799	7,908	11,473	15,705	17,604	638	694	722	735	790

Source : Ministry of Education, Datos y cifras de la ensenanza en Espana, 1964.

Table 24

Total output of University level technical courses (Higher Technical Schools) and Upper-level technician courses - Ratios

(School years 1957/58 - 1961/62)

Years	Output		
	1. Higher technical schools	2. Upper-level technician courses	3. Ratio (1-2)
1957/58	638	1,951	1/3.1
1958/59	694	2,207	1/3.2
1959/60	722	2,620	1/3.6
1960/61	735	2,957	1/4.0
1961/62	789	2,922	1/3.7
Total	3,578	12,657	1/3.5

Table 25

Industrial and vocational courses : Enrolments and output
(School years 1958/59 - 1962/63)

	Enrolments					Output				
	1958/59	1959/60	1960/61	1961/62	1962/63	1958/59	1959/60	1960/61	1961/62	1962/63
"Maestria"										
1. Chemistry	-	-	60	92	107	-	-	-	32	74
2. Electronics	-	-	-	-	-	-	-	-	-	-
3. Electricity	-	-	547	1,044	1,399	-	-	-	320	492
4. Metal	-	-	1,480	2,959	3,820	-	-	-	837	1,597
5. Auto-mechanics	-	-	-	-	20	-	-	-	-	-
6. Wood	-	-	81	114	140	-	-	-	47	67
7. Building construction	-	-	12	26	34	-	-	-	8	10
8. Textiles	-	-	16	36	54	-	-	-	13	12
9. Graphic Arts	-	-	-	-	-	-	-	-	-	-
10. Draughting	-	-	95	224	397	-	-	-	50	73
Total, "Maestria"	-	-	2,291	4,495	5,971	-	-	-	1,307	2,325
Apprenticeship (total) ..	27,132	38,637	42,285	47,257	56,356	(1)	5,336	5,785	6,322	7,720
Pre-apprenticeship (total)	16,894	16,139	17,829	20,127	22,243	-	-	-	-	-
Grand total	44,026	54,776	62,405	71,879	84,570	(1)	5,336	5,785	7,629	10,045

(1) No information available
Source : Ministry of Education, Estadistica de Formación profesional Industrial, 1965.

Table 26

Technical baccalauréat courses : Enrolments and output

(School years 1958/59 - 1962/63)

Field	Enrolments				
	1958/59	1959/60	1960/61	1961/62	1962/63
1. Agriculture - Animal husbandry	(1)	7,655	8,930	10,946	11,435
2. Industry - Mining ...	(1)	5,987	6,266	6,562	7,023
3. Marine - Fishing	(1)	1,102	922	1,022	1,070
4. Administration	(1)	3,048	6,116	8,939	10,968
Total enrolments	15,536	17,792	22,234	27,469	30,496
Output (total)	1,399	1,454	2,130	1,882	1,772

(1) No information available.

Source : Ministry of Education, datos y cifras de la ensenanza en Espana, 1964.

Table 27

Commercial schools. Enrolments and output

(School years 1957/58 - 1961/62)

School Year	Lower-technician grade (Perito-Mercantil)		Upper-technician grade (Profesoro Mercantil)		Total	
	Enrolments	Output	Enrolments	Output	Enrolments	Output
1957/58	(1)	2,906	(1)	968	35,987	3,874
1958/59	(1)	2,543	(1)	813	31,469	3,356
1959/60	18,743	2,568	7,048	901	25,791	3,469
1960/61	16,182	2,356	7,407	797	23,589	3,153
1961/62	11,630	1,785	6,740	722	18,370	2,507

(1) No information available.

Source : Ministry of Education, Datos y cifras de la ensenanza en Espana, 1964.

Table 28

Number of teachers in each level of education
1960, 1975

Teachers	1960	1975
Primary	99,448	141,326
Secondary general	19,384	51,267
Secondary technical	1,861	9,812
Vocational	?	8,827
Higher	6,313	8,950

Source : MRP Report.

Table 29

School capacity, 1963
and new places required, 1964-74

Level and type of institution	Capacity 1963	New places required			(Total) 1964-74
		1964-67	1968-71	1972-74	
1. Primary (total)	3,920	646	293	87	1,026
2. Secondary (total) ..	623	570	636	260	1,466
(i) General	487	493	477	119	1,094
(ii) Technical (incl. technical colleges)	56	50	78	59	187
(iii) vocational	80	22	81	82	185
3. Higher (total)	96	13	57	33	103
(i) Scientific and technical	42	1	23	15	39
(ii) Other	54	12	34	18	64
Total (1, 2 and 3)	4,639	1,229	986	380	2,595

Source : MRP Report.

Table 30

Percentage distribution of total school population between State, "recognised private" and "not recognised" education 1951, 1960

Level and type of education	State		"not recognised" and "free"		"recognised private"	
	1951	1960	1951	1960	1951	1960
1. Primary education	76	76	-	-	24	24
2. Secondary education (total).	26	25	36	29	38	46
(i) General baccalauréat ...	16	17	22	32	62	51
(ii) Commercial schools	21	19	79	81	-	-
(iii) Primary teacher-training	52	36	48	52	-	12
(iv) Vocational training schools	62	37	-	-	38	63
(v) Technical baccalauréat .	100	77	-	-	-	23
(vi) Technical colleges	53	93	47	7	-	-
3. Higher education (total) ...	70	67	30	32	-	1
(i) Technical	84	92	16	5	-	3
(ii) Scientific	80	67	20	33	-	-
(iii) Medicine	75	67	25	33	-	-
(iv) Others	61	49	39	51	-	-

Source : MRP Report.

XVIII. POPULATION AND MANPOWER STATISTICS

(a) Population

82. Population in Spain increased by 64 per cent during the period 1900-1960 and it is estimated that the increase will reach 78 per cent by 1970 (Table 31). Active population in 1964 was 38.3 per cent of total population as indicated in Table 32.

(b) Forecasts of employment

83. As estimated in the MRP study, total employment will pass from 11.6 million in 1960 to 13.5 million in 1975. Both figures include the regular members of the armed forced and security forces which amount to 150,000 men according to the census of 1960. It has been assumed that this figure will not vary between 1960 and 1975. The increase in civilian employment will be 1.9 million, a figure which results from the reduction of employment in agriculture by 1.1 million and an increase of 3.0 million in industry and services (Table 33). In 1975 the agricultural population will represent only 27 per cent of total employment, as against 41 per cent in 1960. Of those jobs outside agriculture, 1.4 million will be in industry and 1.6 million in services.

(c) Educational level of the labour force

84. The educational level of the labour force in 1960 was extremely low. Only 1.7 per cent had reached university level, while 85 per cent completed primary school only or received occupational training; 9 per cent had had no schooling of any kind (Table 34). The occupational structure of the active population for 1975 constitutes a solid basis for assessing the necessary changes in the level of education, since occupation is the most important factor in determining what the proper level of education should be. Table 35 gives the level of education which should be reached in 1975 and the increase this would entail in relation to the stock in 1960. The greatest increase takes place among

technicians, at secondary level, whose stock would have to be multiplied more than five times (MRP study).

(d) Vocational training

85. In view of the special nature of occupational training, and the lack of information in this field, this aspect of manpower is analysed separately. The information in Table 37, although a first approximation shows the size of the problem. In agriculture, for instance, 80 per cent of the active population have received no kind of vocational training, and, as a result of isolation and a crushing routine, their technical knowledge is very rudimentary and not at all in accordance with modern methods of cultivation. In principle, the great majority of workers should receive some kind of vocational training. This goal will not be attainable in a period of 15 years, however, as it is estimated that vocational training would be needed by 1.5 million workers in industry and services, and 1.2 million in agriculture. (MRP study).

Table 31

Total population

(1900-60, actual; 1961-70, estimated)

Year	Population (actual)	Year	Population (estimated)
1900	18,594,405	1961	30,687,631
1910	19,927,152	1962	30,946,732
1920	21,303,162	1963	31,208,027
1930	25,563,867	1964	31,471,525
1940	25,877,971	1966	32,005,210
1950	27,976,755	1968	32,547,946
1960	30,430,698	1970	33,099,885

Source : Instituto Nacional de Estadistica.
Bolletin de Estadistica Núm. 210, Junio, 1962.
Anuario Estadistico, Espana, 1965 (Instituto Nacional de Estadistica).

Table 32

Active population, 1964

Sector	Actual number	% of active population	% of total population
1. Primary sector (Agriculture, forestry, hunting, fishing) ..	4,185,600	34.5	13.2
2. Secondary sector (mining, manufacturing, construction)..	4,234,600	35.0	13.5
3. Tertiary sector (commerce, banks and insurances, transport and communications, public services, other services..	3,656,000	30.5	11.6
Total	12,076,200	100.0	38.3

Source : National Institute of Statistics, 1960 Census

Table 33

Forecasts of employment by division of economic activity 1960 - 1975

	In thousands		Distribution %		Annual rate of increase %
	1960	1975	1960	1975	1960-1975
1. Agriculture (total)	4,803.3	3,713.4	41.3	27.4	- 1.7
2. Industry (total)	3,652.4	5,077.8	31.4	37.4	2.3
(i) Mining	203.5	220.3	1.7	1.6	0.5
(ii) Manufacturing	2,545.9	3,489.4	21.9	54.7	2.1
(iii) Construction	822.1	1,244.9	7.1	9.2	2.8
(iv) Electricity, gas and water	80.8	123.0	0.7	0.9	2.8
3. Services (total)	3,178.5	4,773.1	27.3	35.2	2.7
(i) Trade	820.1	1,294.5	7.0	9.5	3.1
(ii) Banking	125.1	208.0	1.1	1.5	3.4
(iii) Transport and communications	536.5	809.0	4.6	6.0	2.8
(iv) Others	1,696.7	2,461.6	14.6	18.1	2.5
Total employed	11,634.2	13,564.3	100.0	100.0	1.0

Source : National Institute of Statistics, 1960 Census.

Table 34

Distribution of the active civilian population by occupational categories and education level, 1960

	Total (in thousands)	Percentage distribution					
		Higher level	Secondary & Post-secondary level			Primary level	Illiterates
			gen.	tech.	vocat.		
1. Scientific & technical professional workers	121.4	78.4	2.4	11.3	4.9	3.0	-
2. Architects, engineers, surveyors, physicists, chemists	75.9	68.7	3.6	16.7	6.3	4.6	-
3. Other professional workers (excluding the 145,000 teachers)..	134.0	22.8	5.0	3.1	9.0	60.0	-
4. Technical workers	79.7	13.4	10.3	12.5	16.8	47.0	-
5. Administrative, executive and managerial	120.9	13.8	18.3	2.0	4.7	61.2	-
6. Clerical & sales workers	1,387.6	1.5	7.2	1.3	2.7	86.8	0.6
7. Farmers, cattlebreeders and fishermen	4,630.5	0.1	0.2	-	-	84.3	15.4
8. Workers : skilled, semi-skilled, unskilled	4,865.3	-	0.5	0.2	0.2	92.7	6.4
Total active civilian population (including the 145,000 teachers)	11,415.3	1.7	1.7	0.5	1.6	85.5	9.0

Source : MRP Report.

Table 35

Estimated educational attainment of the five primary occupational categories in 1975 (excluding teachers)

	Total (in thousands	Percentage distribution					
		Higher scientific & technical education	Other Higher education	General secondary (including commercial)	Technical secondary & post-secondary	Lower secondary technical & vocational	Below secondary
1. Scientific & technical professional workers (incl. physicians)	153.8	83.7	-	-	13.6	2.7	-
2. Other professional workers..	157.2	-	41.3	42.2	-	-	16.5
3. Technical workers	241.5	2.6	-	-	58.7	32.8	5.9
4. Administrative, executive and managerial workers	264.2	8.7	17.2	30.9	4.6	11.7	26.9
5. Clerical and sales workers	2,231.9	-	1.4	24.7	-	3.8	70.1

Source : MRP Report.

Table 36

Estimated changes in the active civilian population by education levels between 1960 and 1975

(in thousands)

	Stock in 1960 (incl. teachers)	Stock in 1975 (excl. teachers)	Stock of teachers (1975)	Stock in 1975 total	Index 1960 = 100 (incl. teachers)	Annual % rate of increase
1. Total number with higher education	194.0	299.3	49.1	348.7	180	4.0
(i) Scientific and technical (excl. physicians)	59.6	115.6	20.1	136.0	228	5.7
(ii) Physicians	36.1	42.2	1.0	43.2	120	1.2
(iii) Non-scientific and non-technical	98.3	141.5	28.0	169.5	172	3.7
2. Total number with secondary & post-secondary education ..	424.7	1,072.7	161.4	1,230.1	298	7.5
(i) General and commercial ..	224.7	698.9	-	698.9	311	7.9
(ii) Technical	30.0	144.6	3.5	148.1	494	11.2
(iii) Vocational	60.0	199.2	-	195.2	398	9.6
(iv) Medical training	10.0	30.0	-	30.0	300	7.6
(v) Primary teacher-training.	100.0	-	157.9	157.9	158	3.1

Source : MRP Report.

Table 37

Skilled and other (semi-skilled or unskilled) manual workers as a percentage of total manpower in each sector 1960-75

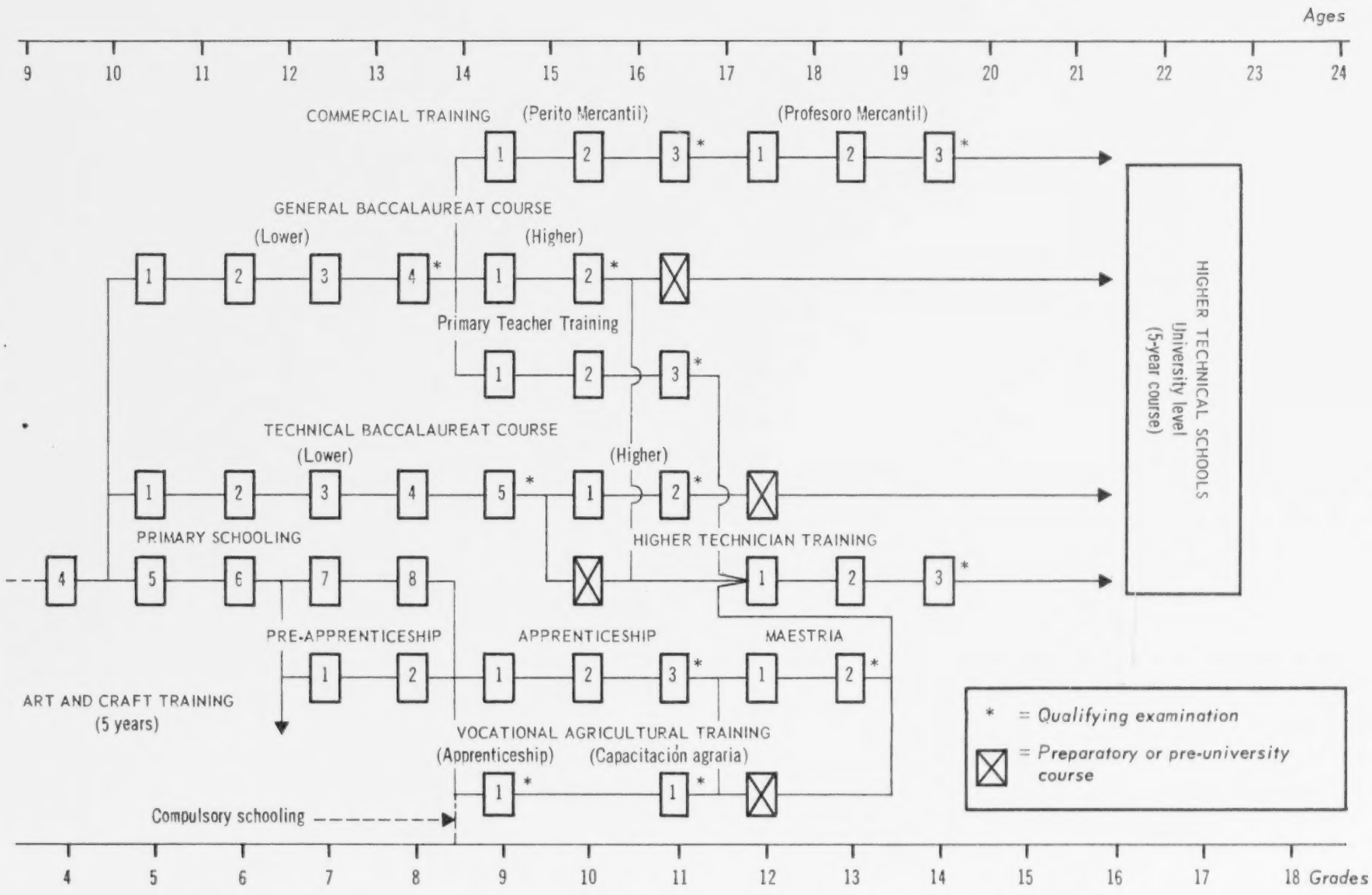
	1960		1975	
	Skilled	Others	Skilled	Others
1. Agriculture	19.9	79.8	50.0	48.9
2. Industry	25.7	62.4	30.5	53.4
3. Trade	1.7	9.9	4.0	6.2
4. Banking	0.1	8.4	1.5	2.6
5. Transport	27.5	61.1	50.5	34.0
6. Other services (excluding education).....	2.9	62.0	6.3	57.8

Source : MRP Report.

APPENDICES

Appendix I

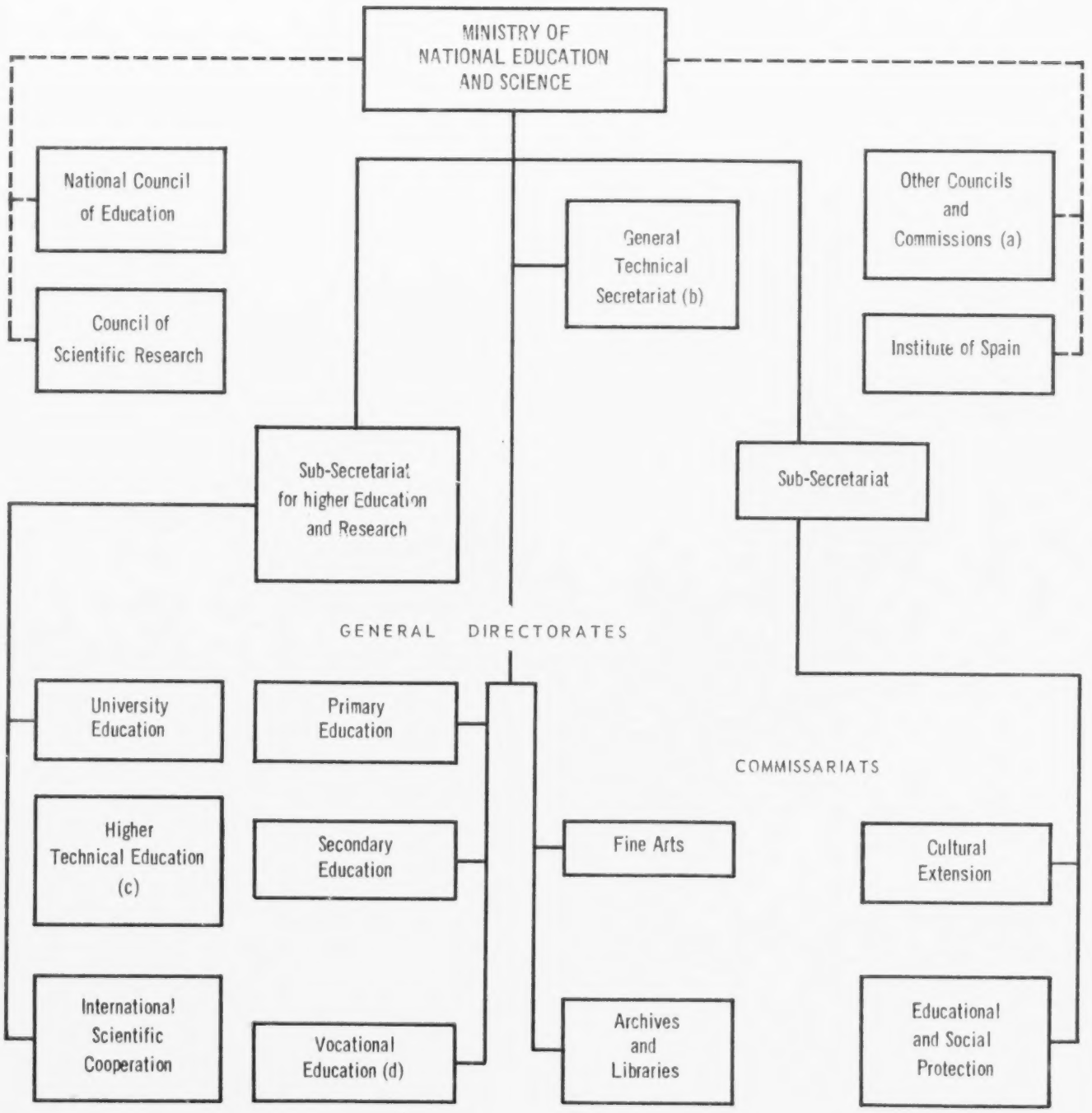
TECHNICAL AND VOCATIONAL COURSES



Appendix II

MINISTRY OF NATIONAL EDUCATION (AND SCIENCE)

ADMINISTRATIVE STRUCTURE



(a) Under "Other Councils and Commissions" are included 21 bodies acting in an advisory and/or administrative capacity (see text for those connected with technical and vocational education).

(b) The "General Technical Secretariat" acts as a co-ordinating service.

(c) The General Directorate for Higher Technical Education covers Higher Technical Schools (university level).

(d) The General Directorate for Vocational Education covers vocational training centres (pre-apprenticeship, Apprenticeship and maestria) as well as technical colleges (upper-level technician courses) and commercial schools. Technical baccalaureat courses come under the General Directorate for Secondary Education.

Appendix III

TECHNICAL BACCALAUREAT COURSES

A. NATURE AND NUMBER OF COURSES AVAILABLE (1965)

Elementary level

(a) Industry and mining	76
(b) Agriculture and animal husbandry	50
(c) Marine and fishing	6
(d) Administration	184
Total	316

Higher level

(a) Industry and mining

1. Machineshop, fitting	9
2. Auto-mechanics	2
3. Industrial organisation - productivity	3
4. Electronics	5
Total, industry & mining	19

(b) Agriculture and animal husbandry

5. Agricultural mechanics	2
6. Pest-control	3
7. Viticulture	3
8. Milk products	1
9. Vegetable canning	2
10. Fruit cultivation	4
11. Horticulture, flow cultivation	2
12. Tropical and equatorial agriculture	1
13. Dry cultivation	1
14. Agriculture	1
15. Meat production	1
16. Clive cultivation and oil production	2
Total, agriculture and animal husbandry	23

(c) Marine and fishing

17. Cultivation of sea-products	2
18. Preservation by freezing	1
Total, marine and fishing	3

(d) Administration

19. Secretarial	46
20. Tourism	10
Total, administration	56
Total, higher level courses	101

Source : Ministry of Education (Ensenanzas profesionales, 1965).

B. SELECTED TIME-TABLES

Table 1

Elementary technical baccalauréat -
Field : industry and mining

Subjects	Instruction periods per week						
	1st year	2nd year	3rd year	4th year	5th year	Total	%
(a) General subjects							
Spanish	6	6	3	3	3	21	
Geography	3	3	-	-	3	9	
English	-	-	3	3	3	9	
History	-	-	3	3	-	6	
Religion	3	2	2	2	2	11	
Physical education ..	3	3	2	1	1	10	
Civics	1	1	1	1	1	5	
Domestic education ..	2	2	2	2	2	10	
Total (general subjects).	(18)	(17)	(16)	(15)	(15)	(81)	44%
(b) Maths, science & technology							
Mathematics	6	4	4	4	4	22	
Natural science	3	-	-	-	-	3	
Physics and chemistry	-	6	6	4	4	20	
Technology	-	1	1	1	1	4	
Industrial culture ..	-	-	5	4	4	13	
Technical drawing ...	3	3	3	3	3	15	
Total (maths, science & technology)	(12)	(14)	(19)	(16)	(16)	(77)	42%
(c) Practical work							
Handicrafts	3	-	-	-	-	3	
Workshop practice ...	-	3	4	8	8	23	
Total (practical work) ..	(3)	(3)	(4)	(8)	(8)	(26)	14%
Grand total	33	34	39	39	39	184	100%

Table 2

Higher technical baccalauréat -
Field : Industry and mining

Specialisation : Machine shop, fitting and auto-mechanics

Subjects	Instruction periods per week			
	1st year	2nd year	Total	%
(a) General subjects				
Spanish	-	2	2	
Geography and history	2	-	2	
English or French	2	3	5	
Religion	1	1	2	
Civics	1	1	2	
Physical education	3	2	5	
Total (general subjects)	(9)	(9)	(18)	25%
(b) Maths, science & technology				
Mathematics	3	3	6	
Physics and chemistry	6	6	12	
Technology	3	3	6	
Technical drawing	3	3	6	
Total (maths, science & technology)	(15)	(15)	(30)	42%
(c) Practical work				
Workshop practice	12	12	24	
Total (practical work)	(12)	(12)	(24)	33%
Grand total	36	36	72	100%

Table 3

Higher technical baccalauréat -

Field : Industry and mining

Specialisation : Electronics

Subjects	Instruction periods per week			
	1st year	2nd year	Total	%
(a) General subjects				
As in table 2				
Total (general subjects)	(9)	(9)	(18)	25%
(b) Maths, science & technology				
Mathematics	3	3	6	
Physics and chemistry	6	6	12	
Technology	6	6	12	
Technical drawing	2	2	4	
Total (maths, science and technology).....	(17)	(17)	(34)	49%
(c) Practical work				
Workshop practice	9	9	18	
Total (practical work)	(9)	(9)	(18)	26%
Grand total	35	35	70	100%

Appendix IV

"MAESTRIA" COURSES

A. NATURE AND NUMBER OF COURSES AVAILABLE (1965)

1.	Chemistry (Laboratory, industrial, steel and metal, plastics, varnishes, and paints)	8
2.	Electronics	11
3.	Electricity	55
4.	Metal (Mechanics, metal construction, foundry)	71
5.	Auto-mechanics	2
6.	Wood	17
7.	Building construction	2
8.	Textiles (Spinning, weaving)	3
9.	Graphic arts (Composition, photo-printing, press printing, book-binding)	1
10.	Drafts-manship (Mechanical, architectural)	13
		183

Source : Ministry of Education (Ensenanza profesionales, 1965).

B. GENERAL TIME-TABLE

Subjects	Instruction periods per week			
	1st year	2nd year	Total	%
1. Practical				45.6
Workshop practice (1)	18	18	36	
2. Related theory				43.0
Mathematics	3	3	6	
Applied Physics and chemistry ..	3	3	6	
Technology of the trade	4	4	8	
Technical drawing (2)	6	6	12	
Industrial organisation	-	2	2	
3. General cultural subjects				11.4
Civics (cultivation of national spirit)	1	2	3	
Religion	1	1	2	
Physical education	2	2	4	
Total	38	41	79	100%

(1) In the case of draftsmen workshop practice (18 hours) is replaced by technical drawing (theory and practice).

(2) Except for draftsmen.

Source : Ministry of Education (Ensenanzas profesionales, 1965).

Appendix V

UPPER-LEVEL TECHNICIAN COURSES

A. NUMBER OF COURSES AVAILABLE - GEOGRAPHICAL DISTRIBUTION (1965)

Field	Place	Number
1. Industrial (mechanical, electrical, chemical, textile)	Alcoy, Barcelona, Bejar, Bilbao, Cadiz, Cartagena, Cordoba, Gijon, Jaen, Las Palmas, Linares, Logrono, Madrid, Malaga, San Sebastian, Santander, Sevilla, Tarrasa, Valencia, Valladolid, Vigo, Villanueva and Geltru, Vitoria, Zaragoza	24
2. Aeronautics	Madrid	1
3. Mining	Almaden, Belmez, Bilbao, Cartagena, Huelva, Leon, Linares, Manresa, Mieres, Torrelavega	10
4. Naval	Cadiz, El Ferrol	2
5. Telecommunications	Madrid	1
6. Architecture	Barcelona, Burgos, La Laguna, Madrid, Sevilla	5
7. Public works	Burgos, Madrid	2
8. Topography	Madrid	1
9. Agriculture	Barcelona, La Laguna, Leon, Lugo, Madrid, Sevilla, Valencia, Villava	8
10. Forestry	Madrid	1
Total		55

B. SYLLABUSES AND TIME-TABLES

Syllabuses and time-tables of upper-level technician courses have to be readjusted to meet the requirements of the recent Reform Act on Technical Education.

The abolition of the selective and preparatory courses, together with the provision made for direct access to technical colleges of students with greatly varied cultural and technical background, is likely to create serious complications as regards uniformity of classes and efficiency of teaching. The Ministry of National Education has appointed a special committee comprising members for education, industry and the professional associations of engineers and technicians to give advice on the steps that should be taken. The Committee has completed its mission, but the whole problem is still under consideration. The tables appearing in this appendix, therefore, illustrate the situation prior to the Reform Act.

Table 1, Appendix (V) shows fields and specialisations available. The common part of the several courses in the same field is illustrated by dots. Further specialisation or "intensive training" (last column) comprises supplementary short courses (usually three months) in special narrow fields of the same specialisation. Tables 2 (V) to 4 (V) represent selected time-tables introduced in 1962 and still in force.

Table 1

Fields and specialisations

Fields	Selective course	Specialisations 1st year	Specialisations 2nd year	Specialisations 3rd year	Further specialisation
1. Industrial engineering	.....	▶ Mechanical engineering			▶ Special short courses
	.....	▶ Electrical engineering			▶
	.....	▶ Chemical engineering			▶
	.....	▶ Metallurgy			▶
	.....	▶ Power			▶
	.....	▶ Textiles, mechanical			▶
	.....	▶ Textiles, chemical			▶
2. Naval engineering	....	....		▶ Hulls	
	....	....		▶ Engines	
3. Forestry	....	....		▶ Forest animals	
	....	....		▶ Forest industries	
4. Aeronautics	....	....		▶ Airports	
	....	....		▶ Flight assistants	
	....	....		▶ Fueling	
	....	....	....	▶ Airships	
	....	....	....	▶ Air-motors	
5. Agriculture	....	....	....	▶ Plants and animals,	▶
	....	....	....	▶ Rural improvement,	▶
	....	....	....	▶ Agr. industries	▶
6. Mining	....	....	....	▶ Mining	
	....	....	....	▶ Metallurgy	
	....	....	....	▶ Elect. install. in mines and factories	
	....	....	....	▶ Combustibles & explosives	
7. Architecture, building construction	....	....	....	▶ Urban works	
	....	....	....	▶ Organis. of work	
	....	....	....	▶ Installations	

Table 1 (cont'd)

Fields	Selective Courses	Specialisations			Further specialisation
		1st year	2nd year	3rd year	
8. Public works	....	....	....	→ Ports and transports	
	....	....	....	→ Power and hydraulics	
	....	....	....	→ Urban works and municipalities	
9. Telecommunications	....	....	....	→ Centres	
	....	....	....	→ Radio communication	
	....	....	....	→ Electricity	
10. Topography	....	....	....	→ Selective subjects	
	....	....	....		
	....	....	....	....	

Table 2

Selective and initiation courses (time-table)

Subjects	Hours per week
(a) Industrial engineering (all specialisations)	
1. Mathematics	10
2. Physics	6
3. Chemistry	6
4. Technical drawing	4
5. Elements of industrial workshop - technology	7
Total	33
(b) Mining	
1. Mathematics	6
2. Physics	6
3. Chemistry	5
4. Technical drawing	4
5. Geological science	3
Total	24
(c) Public works	
1. Mathematics	8
2. Physics	5
3. Chemistry	3
4. Technical drawing	4
5. Construction materials	4
Total	24
(d) Agriculture	
1. Mathematics	6
2. Physics	6
3. Chemistry	6
4. Technical drawing	4
5. Biology	6
Total	28

Table 3

Field : Industrial engineering -
Specialisation - Mechanical engineering

(Time-table)

Subjects	Hours per week			Total	%
	1st year	2nd year	3rd year		
(a) Maths, science, technology (including laboratory work)					
1. Applied maths, statistics, calculations	6*	3	-	9	
2. Descriptive geometry	2*	-	-	2	
3. General mechanics	6*	-	-	6	
4. Heat	5*	-	-	5	
5. Thermodynamics, combustion engines	-	-	6	6	
6. Industrial electricity, electronics	-	6	-	6	
7. Topography	3	-	-	3	
8. Industrial drawing	3*	4	-	7	
9. Strength and resistance of materials, calculations	5	6	-	11	
10. Mechanical construction	-	3	-	3	
11. Mechanical technology, measurements	-	-	8	8	
12. Mechanisms	-	-	5	5	
13. Hydraulics	-	5	-	5	
14. Technical workshop	-	-	6	6	
15. Law	-	2*	-	2	
16. Accounting and costing	-	-	3	3*	
17. Economics	-	-	2	2*	
18. Industrial hygiene, prevention of accidents	-	-	2	2*	
Total (maths,science,technology) ...	(30)	(29)	(32)	(91)	86%
(b) Practical work					
19. Workshop practice	6	6	3	15	14%
Total	36	35	35	106	100%

* Subjects common to all specialisations of "industrial engineering".

Complementary "intensive" training.

Special complementary courses of 3 months' duration are available for those wishing further specialisation in : machine construction, machine maintenance or automation.

Source : Ministry of Education, Hojas informativas, Nov. 1962.

Table 4

Industrial engineering -
Specialisation - Electrical engineering

(Time-table)

Subjects	Hours per week			Total	%
	1st year	2nd year	3rd year		
(a) Maths, science, technology (including laboratory work)					
1. Applied maths, statistics, calculations	6*	3	-	9	
2. Descriptive geometry	2*	-	-	2	
3. Mechanics	5	-	-	5	
4. Heat	5*	-	-	5	
5. Thermodynamics, combustion engines	-	-	6	6	
6. Topography	3	-	-	3	
7. Industrial drawing	3*	4	-	7	
8. Mechanical construction	-	3	-	3	
9. Materials - properties, testing treatment	-	5	-	5	
10. Hydraulics	-	5	-	5	
11. Electricity, measurements	7	-	-	7	
12. Electrotechnology	-	6	6	12	
13. Electronics	-	4	5	9	
14. Technical workshop	-	-	6	6	
15. Law	-	2*	-	2	
16. Account and costing	-	-	3*	3	
17. Economics	-	-	2*	2	
18. Industrial hygiene, prevention of accidents	-	-	2*	2	
Total (maths, science, technology)..	(31)	(32)	(30)	(93)	88.5%
(b) Practical work (Workshop)					
19. Workshop, mechanics	4	-	-	(12)	11.5%
20. Workshop, electricity	-	4	4		
Total	35	36	34	105	100%

* Subjects common to all specialisations of "industrial engineering".

Complementary intensive training

Special complementary courses of 3 months' duration are available for those wishing further specialisation in : construction of electrical machines, maintenance of electrical machines, power production, electrical installation, electronics and automation, illumination.

Source : Ministry of Education, Hojas informativas, Nov. 1962.

Table 5

Public Works -
Specialisation - Ports and Transports (1)

(Time-table)

Subjects	Hours per week			Total
	1st year	2nd year	3rd year	
1. Methods of presentation	5	-	-	5
2. Mechanics	3	-	-	3
3. Geology	1	-	-	1
4. Machines and other auxiliary means	1	-	-	1
5. Resistance of materials	4	-	-	4
6. Topography	8	5	-	13
7. Hydraulics	3	3	-	6
8. Soil mechanics	3	-	-	3
9. Construction	-	4	-	4
10. Electrotechnology	-	4	-	4
11. Roads	-	3	-	3
12. Railways	-	3	4	7
13. Ports	-	2	7	9
14. Buildings	-	3	-	3
15. Roads and airports	-	-	4	4
16. Transports -organisation and legislation	-	-	2	2
17. Accounting and service organisation	-	1	-	1
18. Administration	-	1	-	1
19. Work organisation	-	-	7	7
Total	28	29	24	81

(1) There are two more specialisations :

(i) Hydraulics and power;

(ii) Urban work and municipalities.

The two first years of the course are common for all specialisations.

Source : Ministry of Education. Hojas informativas, Nov. 1962.

Appendix VI

TECHNICAL AND OTHER VOCATIONAL TRAINING INSTITUTIONS

A. AUTHORITIES IN CHARGE, NUMBERS AND TYPES OF INSTITUTION "RECOGNISED" BY THE STATE

(School year 1962/63)

Type of institution	Authority in charge - No. of inst.					Total
	Ministry of Education	Ministry of Labour	Church	Trade Unions	Private Bodies	
1. Secondary technical school (Bachillerato Laboral)	93	5	109	2	23	232
2. Vocational Training Centres (Pre-apprenticeship, apprenticeship, "Maestria")	99	5	66	64	129	363
3. Commercial schools (Perito mercantil, Profesoro mercantil)	42	-	-	-	-	42
4. Technical colleges (Perito courses)	51	-	-	-	-	51
5. Higher technical schools (University level)	16	-	1	-	2	19

Source : (a) Instituto Nacional de Estadistica, Espana, 1965 (Items 1, 3, 4, and 5).
(b) Ministry of Education, Estadistica de Formación Profesional Industrial, 1965 (Item 2).

B. VOCATIONAL TRAINING CENTRES RECOGNISED BY THE STATE 1962/63

(Analysis of item 2 in the preceding table)

Type of course	Authority in charge - Numbers					Total
	Ministry of Education	Ministry of Labour	Church	Trade Unions	Other Bodies	
1. Pre-apprenticeship courses	-	-	12	3	21	36
2. Pre-apprenticeship and apprenticeship courses	27	-	37	38	58	160
3. Apprenticeship courses	40	-	1	16	42	99
4. Apprenticeship and "maestria" courses	19	1	1	-	1	22
5. Pre-apprenticeship, apprenticeship and "maestria" courses	13	4	15	7	7	46
Total	99	5	66	64	129	363

Number of centres holding pre-apprenticeship courses 246

Number of centres holding apprenticeship courses 323

Number of centres holding "maestria" courses 72

Source : Ministry of Education, Estadistica de Formación Profesional Industrial, 1965.

Appendix VII

TECHNICAL COURSES AT UNIVERSITY LEVEL

Nature and number of courses available (1965)

Field	Place	No. of courses
1. Industrial engineering (1) (electrical, mechanical, chemical, textile, power, acoustics and optics)	Barcelona, Bilbao, Madrid, Navarra, Soria, Sevilla, Tarrasa	8
2. Aeronautics	Madrid	1
3. Mining	Madrid, Oviedo	2
4. Naval engineering	Madrid	1
5. Telecommunications	Madrid	1
6. Architecture	Barcelona, Madrid, Sevilla	3
7. Civil engineering	Madrid, Santander	2
8. Agronomy	Cordoba, Madrid Valencia	3
9. Forestry	Madrid	1
		22

(1) The following industrial engineering courses are run by private institutions :

(i) Electro-mechanical engineering (Institut Catholique des Arts et Industries, Madrid)

(ii) Mechanical engineering (Institute of San Sebastian, Navarra)

(iii) Chemical engineering (Institute Quimico in Soria)

Appendix VIII

A SURVEY ON FUNCTIONS OF TECHNICIANS IN INDUSTRY

A. Breakdown of the Labour Force by category of skill and firm size

Firm	(a) Professional engineers or equivalent	(b) Technicians	(c) Skilled workers	(d) Unskilled workers	(e) Other workers	(f) Total labour force	(g) Technicians as a % of
A1	166	1,313	2,265	3,991	2,218	9,953	13
A2	46	319	905	1,922	494	3,686	9
A3	5	34	256	370	38	703	5
Total A1-A3	217	1,666	3,426	6,283	2,750	14,342	12%
B1	2	22	384	243	233	884	3
B2	2	31	166	89	37	325	10
B3	3	62	409	253	199	926	7
Total B1-B3	7	115	959	585	469	2,135	5%
C1	132	392	2,495	157	1,218	4,394	9
C2	125	422	1,358	160	685	2,750	15
C3	16	136	552	538	127	1,369	10
Total C1-C3	273	950	4,405	855	2,030	8,513	11%
Grand total	497	2,731	8,790	7,723	5,249	24,990	11%

A. Manufacturing of electronic and electrical instruments.
B. Manufacturing of machine tools.
C. Supply and distribution of electricity.

B. Posts occupied by the technicians interviewed

Firm	Title	Immediate Superior	Qualification possessed		Qualification desired by firm
			Diplomas, Certs.	Other	
A1	1. Head of production, planning and design	E	UB-MI-ITE(1)	SC(1)	IT but with more emphasis on theoretical studies
	2. Head of production, planning and design	PE	UB-ITM	-	
	3. Erection shop foreman	MI	-	PS.VS.SC.	MI + supervisory courses
	4. Press shop foreman	MI	-	PS.VS.SC.	" " "
A2	5. Head of toolroom	E	ITM	SC.IT	but with more emphasis on theoretical study
	6. T.V. Factor Manager	E	UB-ITM	SC.ITM	but with more electronics
	7. Foreman of signal-equipment shop				MI but with more practical training
A3	8. Chief electrical and mechanic inspector	PI	UB	SC	"
	9. Head of Time Study Dept.	E	ITM	-	IT but with increased practical training
	10. Head of electrical testing	E	ITE	-	IT - present level satisfactory
	11. Machine shop foreman	PI	LB	Appr. (4 years) SC	IT - present level satisfactory
	12. Winding shop and assembly foreman	PI	-	PS-Sec.(3) + appr. (5 years)	Present level satisfactory

Firm	Title	Immediate Superior	Qualifications possessed		Qualification desired by firm
			Diplomas, Certs.	Other	
B1	13. Head of production planning and machine-tool production	E	UB-ITM	-	ITM but with increased technological studies and workshop practice
	14. Head of machine-tool production	E	MIM-ITM	-	PIM but with greater emphasis on automatic control systems
	15. Foreman, components production	PI	-	PS-VS	MI
	16. Erection shop foreman	PI	-	PS-VS	MI
B2	17. Head of methods' office and time study	E	MIM-ITM	SC	IT with experiments in industry
	18. Head of inspection of quality control	General Manager	MIM-ITM	SC	"
	19. Machine tool erection foreman	MI	Technician in mechanical engineering (corresp.)	PS Pre-apprent.	Slightly higher than MI
	20. Grinding machine chargehand	MI	-	PS corresp. Sch. SC	Slightly lower than MI
B3	21. Superintendent (production and erections)	E	Shop superintendent (corresp.)	PS-VS corresp. SC	Below IT
	22. Superintendent (production, erection and fabrication)	E	LB-ITM	SC	Slightly below IT
	23. Chargehand (machine erection)	PI	LB	VS	MI

Firm	Title	Immediate Superior	Qualification possessed		Qualification desired by firm
			Diplomas, Certs.	Other	
C1	24. Chargehand (erection)	PI	LB	VS	MI
	25. Head of projects and installation dept.	E	ITE	SC	IT
	26. Head of repairs section	PI	Mechanics (some for aircraft-mechanics, air force)	PS	MI
C2	27. Head of distribution, transformers, stationary dept.	E	LB-ITE	SC	IT
	28. Head of construction and operation dept. and specifications	E	Project design (private)	PS private Sc. SC	IT
	29. Low voltage installation designer	PI	MIE	-	MIE but with broader training in electrical subjects
C3	30. In charge of maintenance of high-voltage	PI	MIM-MIE	SC	MIE but with broader training in electrical subjects
	31. Class I power station superintendent	E	MIE-ITE	SC	IT
	32. Class II power station superintendent	PI	-	PS-VS-SC	MI

(1) Abbreviations

E Professional Engineer
LB Lower general baccalauréat
UB Upper " "
MI Maestro Industrial
MIM Maestro Industrial Mechanico
MIE Maestro Industrial Electrico
IT Industrial Technician (upper-level)
ITM Industrial Technician, Mechanical
ITE Industrial Technician, Electrical
PS Primary School
VS Vocational School
SC Short courses (technical, supervisory, etc.)

Appendix IX

SELECTED LIST OF INDIVIDUALS AND ORGANISATIONS CONSULTED

1. Ministry of National Education

   (i) Commissariat of International Scientific Co-operation
   (Mr. J.R.P. Alvarez-Ossorio, Comisario)

   (ii) Directorate of Technical Education
   (Mr. Teller, Secretary)

   (iii) Directorate of National Education
   (Mr. Ozalla, Secretary)

   (iv) Documentation Centre
   (Mr. Estades, in charge)

   (v) Institute for the Training of Vocational Teachers
   (Mr. J.M. Mohedano, Director)

2. Ministry of Labour

   (i) Section of Professional Training
   (Mr. Alia)

   (ii) Section of Social Promotion

3. Ministry of Commerce and Industry

   National Commission of industrial productivity
   (Mr. J. Elozdug, Director)

4. Ministry of Agriculture

Directorate of Training and Extension Service
(Mr. M. Olivas, Director General)

5. Ministry of Information and Tourism

Institute for Touristic Studies
(Mr. Alcaide, Director General)

6. National Institute of Applied Psychology & Psychotechnics

(Deputy Director)

7. National Institute of Statistics (Instituto Nacional de Estadistica)

(Mr. J. Ballester, Educational Statistics)

8. Chamber of Industries of Madrid (Coimara de la Industria, Madrid)

(Mr. D.F. Rajon, Secretary, Section of Statistics)

9. Association of University Engineers (Instituto de Ingenieros Civiles)

Mr. F. Callego, Secretary General)

10. National Association of Industrial Peritos (Association Nacional de Peritos Industriales)

(General Secretary, six members)

11. Association of Industrial Peritos of Madrid (Collegio de Peritos Industriales de Madrid)

(Mr. Barrio, Technical Secretary)

12. Trade Union Congress (Delegacion Nacional de Sindicatos)

(Mr. Nomesio, Secretary)

Appendix X

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Appendix XI

CONCLUSIONS OF THE CONFRONTATION MEETINGS

A. CONFRONTATION MEETING FOR

THE NETHERLANDS - SPAIN - SWITZERLAND - YUGOSLAVIA

1. The discussions followed the procedure adopted in the previous confrontation meeting between Canada and Denmark, the main conclusions of which were adopted by the meeting. These conclusions are incorporated here as Part B of this Appendix for the sake of easy reference.

2. The participation of a large number of countries with different systems and methods and the availability of completed reports on these countries made the discussion extremely profitable and lively and brought to light issues which had not appeared before. A brief account of these new issues as they have been discussed under the various agenda items is given below.

(a) Standardised qualifications

3. It appears that an attempt to set international standards as regards technician training courses will not lead to any valid results, because of the existing great differences in structure and content of these courses in the various countries. However, it would be useful to define the minimum qualifications required for each grade so as to

devise a yardstick against which one could measure and evaluate the situation in each Member country.

(b) The technician force

4. In most cases technician courses aim at the production of middle level technical manpower to fill in existing gaps in the rapidly developing economy. It should be emphasised, however, that in the case of countries in the process of industrialisation, availability of such a technical force might play a decisive role in the establishment of new industrial concerns and be a prerequisite to set developing industry on a sound and competitive basis.

5. When planning for technical education it is important to know, among other things, the appropriate ratio : university engineer/higher technicians. Although this ratio may vary from country to country, depending mainly on the nature of industry, it is observed that in the majority of cases, a technician force three times larger than the respective engineering force will be required to support and supplement effectively the latter.

6. It was observed that in all four countries under examination there was a scarcity of higher technicians. Among the reasons given for this scarcity, the following, although not always universally applicable, are worthy of notice :

(i) Inadequate supply of information to parents and prospective students, as regards technician studies and careers, due to lack of properly organised and functioning educational and vocational orientation and guidance service.

(ii) The role of higher technicians in industry is not, in all cases, well defined and appreciated. The social and professional status of the technician is still vague and in many cases technicians are still considered as "second class" engineers.

(iii) Promotion possibilities through further studies are, in certain cases, extremely limited. Although the vast majority of technicians are expected to enter the "economy" directly, provision should be made for those who have the ability and interest to be enabled to continue their studies for higher qualifications.

(iv) The educational system is finding it extremely difficult to keep pace with the constantly increasing demand of a rapidly developing industry.

(v) Lack of reliable statistical data on present and future needs in technical manpower does not permit effective planning in the educational field.

(c) Technician training courses

7. When using the term "apprenticeship" one should have in mind that it does not necessarily refer to craft training only. There are countries, such as the United Kingdom, where apprenticeship training covers the whole range of technical force from the skilled worker up to and including the university engineer.

8. Although school-training is indispensable it should be realised that it has its limitations. Therefore, training within industry should constitute an integral part of the technician training process.

9. It was agreed that there are at least two possible ways of training in order to ensure desirable adaptability of the "end-product" to the continuously changing needs of modern technology :

(i) To give narrow and deep specialisation providing for retraining possibilities on similar bases, as might be proposed by a special "retraining committee";

(ii) To give broad scientific and technical background training allowing for further specialisation within industry. Special short courses on new developments and techniques may be organised by the technical colleges in collaboration with industry. It appears that the latter method of training gives better results as regards both the quality and adaptability of technical personnel and is therefore highly recommended.

10. As technology is developing at a rapid pace it does not appear feasible for the educational system to keep abreast of it. Therefore industry is expected to react first by providing necessary training courses, which may then be adopted and further developed by the technical colleges.

(d) Co-ordination of efforts in the training process - industry participation

11. The establishment of a co-ordinating mechanism charged with policy making and all other matters related to technical education and training is considered of vital importance, no matter what the social and political structure of the country is. Such a mechanism should be composed of representatives of the educational authorities, the teaching force, other governmental and private institutions participating in the training scheme, employers' and employees' associations and industry.

12. Under Item 5 of the agenda the several forms of participation of industry in the training process were thoroughly discussed. It was agreed that active participation of industry, including jointly financed (industry and education) training programmes, is of vital importance and positively contributes to the development of technical education and training. Reference was also made to the pattern of co-operation between industry and education developed recently by the United Kingdom. (Technical training, under the Industrial Training Act, 1964).

13. Participation of industry representatives in a central co-ordinating mechanism (see paragraph 11 above), in technical school boards and examination boards and the establishment of jointly financed (government and industry) training programmes are considered as realistic measures to secure the desirable active participation on its part.

(e) Recruitment and training of technical teachers

14. In the discussion of the problem of recruitment and training of technical teachers, it was revealed that all four countries experience much difficulty in securing in adequate numbers properly qualified personnel to cope with modern industrial and educational requirements.

15. In order to be efficient in his job, a technical teacher should possess adequate knowledge in a variety of subjects. Technical knowledge and experience should be supplemented by pedagogical training covering child and adult education, psychology of the trade, labour market problems, industrial organisation and financing, productivity,

etc. Such knowledge can only be acquired through special training which should, therefore, be regarded as part and parcel of the technical teacher training process.

16. Entrants from industry to teaching, lacking pedagogical training, frequently experience great difficulty in performing teaching tasks. Often they have to learn by trial and error and the students suffer from their initial ignorance of efficient teaching methods. On the other hand, experience of certain countries shows that, as a general rule, adult personnel originating from industry are rather reluctant to readjust themselves to school conditions and be exposed to formal training.

B. CONFRONTATION MEETING FOR CANADA AND DENMARK

(Revised version)

(a) Delineation of the category of skilled labour force under consideration

1. It was agreed that a "scholastic" definition of the technician should be avoided. The force under consideration was defined as that which lies between the skilled worker at the one end and the professional engineer at the other.

2. It was decided that although discussions should be focussed on engineering technicians, as information available was mainly in this field, technicians in other fields should be also covered as adequately as possible.

(b) Level of Technicians - Certification - Training

3. It was agreed that the technician force should be classified in two main levels, provisionally termed the junior or lower technician level and the senior or upper technician level. The classification should be based not on functional assignments but on educational qualifications which need not necessarily be acquired in a formal way.

4. Difficulty was experienced in comparing the training programmes of the two countries because of differences in basic principles. The Danish system is mainly based on apprenticeship training while the Canadian is entirely institutional. After discussion it was agreed that though apprenticeship should not be a prerequisite for technician training a period of practical training in industry is essential. The Danish authorities have already realised this fact and are planning to reduce the apprenticeship period preceding technician training.

5. By comparing the "Teknikum Engineer" of Denmark with the "Technologist" of Canada it became evident that Senior Technician training should be a standardised post-secondary training of a less theoretical but positively more practical character than the university level training in parallel fields.

6. By studying the fields of activity of Junior technicians it was agreed that Junior technician training programmes should be of a flexible character and duration, and should be particularly adapted to the needs of the individual trade in each country. A basic general education of at least 10 years was considered an essential prerequisite for the production of an adaptable "end product". This educational background together with the additional education and training acquired through the course proper, should bring the junior technician to an educational level comparable to that of a full secondary education.

Specific training programmes were further discussed on the basis of an illustrated exposé (projection of slides) by the Danish Delegation.

7. Standardised certification, already well ahead in Denmark, was considered essential not only at national level but also internationally. OECD was invited to assist Member countries in this respect.

(c) Vocational Guidance service - Wastage from technical courses

8. Study of relevant information revealed that vocational guidance services in both countries are not adequately organised. It was decided that further steps should be taken to establish effective services in both the vocational guidance and the vocational selection fields.

9. Wastage from Senior Technician and University courses appeared to be a major problem, particularly in Canada. Many factors appear to influence this wastage; undoubtedly among them the inadequate method of vocational guidance and selection.

It was decided that further investigation should be undertaken to define (i) the reasons for high wastage, (ii) what happens to the "drop-outs".

(d) Recruitment and training of technical teachers

10. In both countries recruitment of technical teachers presents difficulties because of the scarcity of properly qualified personnel and the competition from industry.

11. It was agreed that a technical teacher :

(i) should possess qualifications ensuring thorough theoretical and practical knowledge of the subject he is expected to teach;

(ii) should have industrial experience in appropriate fields;

(iii) should be familiar with basic educational principles and possess adequate knowledge of teaching methods and techniques;

(iv) should be kept continuously aware of new developments in the educational and the industrial fields.

To ensure this, it was agreed that this represented an important area where further governmental action was necessary. OECD was invited to assist the countries in this field.

12. The possibility of securing part-time services of personnel from industry was discussed. It was agreed that this procedure though difficult to put into practice, at least so far as day courses are concerned, should be further explored; in effect it encouraged the person involved to keep continuously up to date in both the theoretical and the practical fields.

13. Further discussion led to the conclusion that a reciprocal flow from industry to education and vice-versa is highly desirable. To ensure this, establishment of rules for recognition of a "continuity of service" (years of service, pension, etc.) would be necessary. In

Denmark this problem is being tackled by the technicians' professional association.

14. Discussion of the status and salaries of technical teachers revealed that authorities in charge should be advised to devise salary scales, pension allowance, etc., competitive with those offered by industry.

(e) Authorities in charge of technical and vocational education - Co-ordination of efforts

15. Provincial autonomy in Canada creates a special situation and makes comparison with Denmark or some other European countries difficult. Discussion led to the conclusion that, although decentralisation is for several reasons advisable, the existence of a central co-ordinating authority is indispensable to ensure the requirements of sound educational policy at national level and the desirable standardisation of qualifications as a pre-requisite for internal mobility.

(f) Status of technicians and their careers

16. Study of the information available led to the conclusion that in both countries there exist at present two types of technicians, namely:

(i) those classified as technicians by virtue of their educational qualifications;

(ii) those who because of their long experience and aptitude perform duties of technicians, regardless of their formal qualifications.

The latter category however was in both cases created to meet the urgent requirements of rapid industrial expansion with which the provision of educational facilities could not keep pace; this category is gradually fading out in both countries.

17. Discussion of the organisation and functions of technicians' professional associations led to the conclusion that the establishment of such associations should be encouraged as they greatly contribute to the social recognition of the professional status of this category of skilled personnel. The successful example of Denmark should encourage

other countries to proceed in the same direction.

18. Discussion on the earnings of technicians in industry revealed that these largely depend on the personal ability of the individual and in some cases are higher than those of the professional engineers.

19. The limited possibilities existing in the two countries for promotion from skilled worker to Junior Technician to Senior Technician were shown to be a feature of the present situation. However, in Denmark,it appears that Teknikum Engineers have many more opportunities as compared to their Canadian counterparts (technologists), to undertake managerial or technical jobs, normally requiring an engineering degree in industry.

20. It is recommended that promotion from one skilled category to another through further studies be encouraged and facilitated through inter-relating the structure and content of the training programmes. However, it should always be kept in mind that training for each skilled category is an entity in itself and cannot be regarded as part of another; consequently, unnecessary distortion of training programmes for the sake of continuity and transferability should definitely be avoided.

(b) Availability of statistical data

21. It became clear that in both countries availability of statistical data enabling the planning and implementation of technician training programmes is inadequate or does not exist at all. It was decided that efforts should be made to secure such data mainly based on the real needs of industry and not on the available capacity of the educational establishments. It was made clear however that one of the main difficulties in estimating the needs of industry in skilled manpower was the hesitation of industry itself to make any firm statement as regards future needs; it was further pointed out that Research and Development Services are usually more reliable sources for such information.

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